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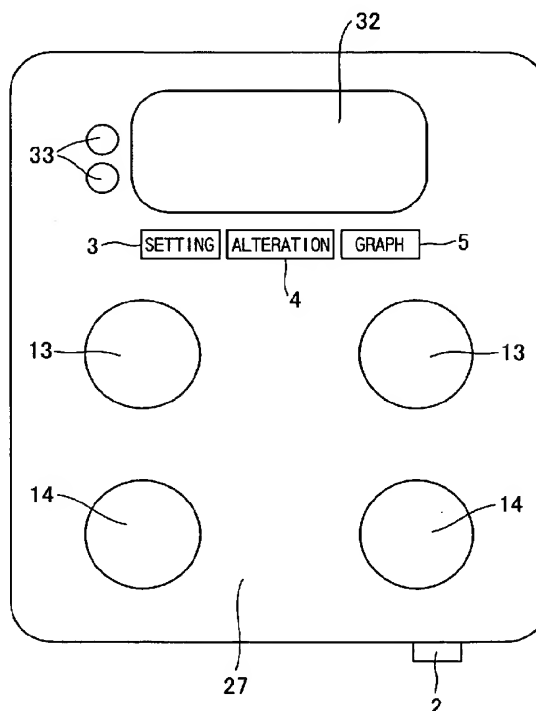
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(54) **Body composition meter adapted for children**

(57) There is provided a body composition meter having a function of determining the body compositions of children by which a subject can conveniently acquire highly reliable data about determination of a proper grade for the body composition of the child.

In the body composition meter, child body composition determining means determines a proper grade for a value associated with the body composition of a child which corresponds to the value associated with the body composition of the child acquired by body composition acquiring means and an indicator indicating the level of the growth of the child acquired by growth indicator acquiring means by referring to a body composition determination standard (which shows proper grades for values associated with the body composition of children as a plurality of ranges according to an indicator indicating the level of the growth of children based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges) stored in child body composition determination standard storing means.

**FIG. 1A**



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FIG. 1B

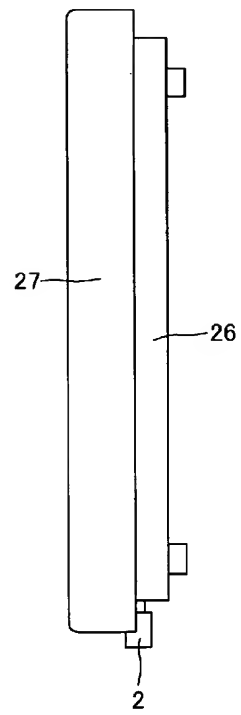
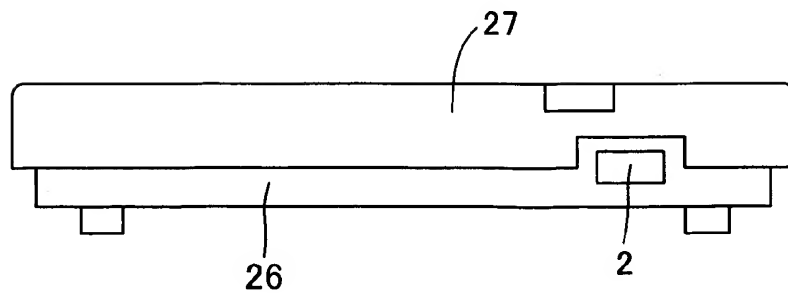


FIG. 1C



**Description****BACKGROUND OF THE INVENTION****(i) Field of the Invention**

**[0001]** The present invention relates to a body composition meter having a function of determining the body compositions of children which measures a value associated with the body composition (which is generally used as a generic term for body fat, visceral fat, subcutaneous fat, muscles, bone, body water and other components in the human body) of children who are in a significant growth period in the growing process of human beings and determines a proper grade for the measured value associated with the body composition.

**(ii) Description of the Related Art**

**[0002]** Heretofore, a number of apparatuses which measure a living body have been introduced to the market from the viewpoint of health consciousness. Further, in recent years in particular, apparatuses capable of measuring a value associated with body fat, visceral fat or the like and determining a proper grade for the measured value associated with body fat, visceral fat or the like have been increasingly introduced to the market, since obesity may cause lifestyle-related diseases.

**[0003]** Examples of such apparatuses are disclosed in the following Patent Publications.

**[0004]** An apparatus disclosed in Patent Publication 1 measures a body fat area and determines which determination area the measured body fat area belongs to.

**[0005]** An apparatus disclosed in Patent Publication 2 measures a body fat percentage and determines which determination area the measured body fat percentage belongs to, calculates a BMI and determines which determination area the calculated BMI belongs to, and makes an overall determination on which determination area both of these determination results belong to.

**[0006]** An apparatus disclosed in Patent Publication 3 calculates a BMI, a body fat percentage and an abdominal visceral fat cross-sectional area from measured and entered data and determines which determination area each of the calculated BMI, body fat percentage and abdominal visceral fat cross-sectional area belongs to.

**[0007]** These apparatuses are very convenient and useful for health management because users can not only acquire a result such as a body fat area but also know a proper grade for the result by use of these apparatuses.

Patent Publication 1

**[0008]** Japanese Patent Laid-Open Publication No. 2002-191563

Patent Publication 2

**[0009]** Japanese Patent Laid-Open Publication No. 2002-191573

Patent Publication 3

**[0010]** Japanese Patent Laid-Open Publication No. 2003-52659

**[0011]** However, determination standards in the above apparatuses are differentiated merely by sex, i.e. males and females, and are intended for both children and adults or for adults only. The determination standards intended for both children and adults lack reliability because children and adults are different in the level of growth and borderlines for proper grades should be different accordingly. Meanwhile, the determination standards intended for adults only are inconvenient because determinations cannot be made on infants and children with the determination standards.

**[0012]** Under the above circumstances, an object of the present invention is to provide a body composition meter having a function of determining the body compositions of children by which a subject can conveniently acquire highly reliable data about determination of a proper grade for the body composition of the child.

**SUMMARY OF THE INVENTION**

**[0013]** To achieve the above object, according to one aspect, a body composition meter having a function of determining the body compositions of children according to the present invention comprises:

body composition acquiring means,  
growth indicator acquiring means,  
child body composition determination standard storing means,  
child body composition determining means, and  
determination result displaying means,  
wherein  
the body composition acquiring means acquires a value associated with the body composition of a child,  
the growth indicator acquiring means acquires an indicator indicating the level of the growth of the child,  
the child body composition determination standard storing means stores a body composition determination standard showing proper grades for values associated with the body composition of children as a plurality of ranges according to an indicator indicating the level of the growth of children based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges,  
the child body composition determining means determines a proper grade for the value associated with the body composition of the child which corresponds

to the value acquired by the body composition acquiring means and the indicator acquired by the growth indicator acquiring means by referring to the body composition determination standard stored in the child body composition determination standard storing means, and

the determination result displaying means displays the result of the proper grade for the value associated with the body composition of the child determined by the child body composition determining means.

**[0014]** Further, according to one embodiment of this aspect, the body composition meter further comprises:

determination object selecting means,  
wherein

the determination object selecting means selects a value associated with the body composition of the child which is to be acquired by the body composition acquiring means, and

the body composition acquiring means acquires the value associated with the body composition of the child selected by the determination object selecting means.

**[0015]** Further, according to another embodiment of this aspect, the determination result displaying means displays history graphs in turn,  
the history graphs each comprising a time axis and a body composition value axis,  
the history graphs showing the current value associated with the body composition of the child together with past values associated with the body composition of the child such that the current value is positioned in the center of the time axis,  
one history graph showing a transition of the values by weeks, another history graph showing the transition of the values by months,  
the other history graph showing the transition of the values by years.

**[0016]** Further, according to another embodiment of this aspect, the body composition meter further comprises:

abrupt change warning means,  
wherein

the abrupt change warning means gives a warning when the amount of change between the current value associated with the body composition of the child acquired by the body composition acquiring means and the past values associated with the body composition of the child is larger than a predetermined range value.

**[0017]** Further, according to another embodiment of this aspect, the indicator indicating the level of the growth of the child is age.

**[0018]** Further, according to another embodiment of

this aspect, the body composition determination standard shows proper grades for values associated with the body composition of children as a plurality of ranges at a 1-age interval based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges.

**[0019]** Further, according to another embodiment of this aspect, the indicator indicating the level of the growth of the child is a body height.

**[0020]** Further, according to another embodiment of this aspect, the body composition determination standard shows proper grades for values associated with the body composition of children as a plurality of ranges at intervals of 5 cm in body height based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges.

**[0021]** Further, according to another embodiment of this aspect, the value associated with the body composition is a fat free percentage, a body fat percentage or a muscle percentage.

**[0022]** Further, according to another embodiment of this aspect, the value associated with obesity is the degree of obesity, a BMI or a Rohrer index.

**[0023]** Further, according to another aspect, a body composition meter having a function of determining the body compositions of children according to the present invention comprises:

body composition acquiring means,  
growth indicator acquiring means,  
child body composition determination standard storing means,  
body composition determination standard selecting means,  
child body composition determining means, and  
determination result displaying means,  
wherein

the body composition acquiring means acquires a value associated with the body composition of a child,  
the growth indicator acquiring means acquires different indicators indicating the level of the growth of the child,

the child body composition determination standard storing means stores a plurality of body composition determination standards showing proper grades for values associated with the body composition of children as a plurality of ranges according to an indicator indicating the level of the growth of children based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges, for each of the different indicators indicating the level of the growth of the child,

the body composition determination standard selecting means selects a body composition determination standard from the body composition determination

standards stored in the child body composition determination standard storing means, the child body composition determining means determines a proper grade for the value associated with the body composition of the child which corresponds to the value acquired by the body composition acquiring means and the indicator corresponding to the body composition determination standard selected by the body composition determination standard selecting means out of the different indicators acquired by the growth indicator acquiring means, by referring to the body composition determination standard selected by the body composition determination standard selecting means, and the determination result displaying means displays the result of the proper grade for the value associated with the body composition of the child determined by the child body composition determining means.

**[0024]** Further, according to one embodiment of this aspect, the body composition meter further comprises:

determination object selecting means, wherein the determination object selecting means selects a value associated with the body composition of the child which is to be acquired by the body composition acquiring means, and the body composition acquiring means acquires the value associated with the body composition of the child selected by the determination object selecting means.

**[0025]** Further, according to another embodiment of this aspect, the determination result displaying means displays history graphs in turn, the history graphs each comprising a time axis and a body composition value axis, the history graphs showing the current value associated with the body composition of the child together with past values associated with the body composition of the child such that the current value is positioned in the center of the time axis, one history graph showing a transition of the values by weeks, another history graph showing the transition of the values by months, the other history graph showing the transition of the values by years.

**[0026]** Further, according to another embodiment of this aspect, the body composition meter further comprises:

abrupt change warning means, wherein the abrupt change warning means gives a warning when the amount of change between the current value associated with the body composition of the child acquired by the body composition acquiring means

and the past values associated with the body composition of the child is larger than a predetermined range value.

**[0027]** Further, according to another embodiment of this aspect, the different indicators indicating the level of the growth of the child are age and a body height.

**[0028]** Further, according to another embodiment of this aspect, the body composition determination standards show proper grades for values associated with the body composition of children as a plurality of ranges at a 1-age interval based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges and show proper grades for values associated with the body composition of children as a plurality of ranges at intervals of 5 cm in body height based on the obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges.

**[0029]** Further, according to another embodiment of this aspect, the value associated with the body composition is a fat free percentage, a body fat percentage or a muscle percentage.

**[0030]** Further, according to another embodiment of this aspect, the value associated with obesity is the degree of obesity, a BMI or a Rohrer index.

**[0031]** Further, according to another embodiment of this aspect, the body composition determination standard is intended for children of ages 5 to 18.

**[0032]** Further, according to another embodiment of this aspect, the body composition determination standard is intended for children of ages 6 to 17.

**[0033]** In the body composition meter having a function of determining the body compositions of children according to the present invention, the child body composition determining means determines a proper grade for a value associated with the body composition of a child which corresponds to the value associated with the body composition of the child acquired by the body composition acquiring means and an indicator indicating the level of the growth of the child acquired by the growth indicator acquiring means by referring to a body composition determination standard (which shows proper grades for values associated with the body composition of children as a plurality of ranges according to an indicator indicating the level of the growth of children based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges) stored in the child body composition determination standard storing means. Thus, a subject can conveniently acquire highly reliable data about determination of a proper grade for the body composition of the child.

**[0034]** Further, in the body composition meter having a function of determining the body compositions of children according to the present invention, the child body composition determining means determines a proper grade for a value associated with the body composition of a child which corresponds to the value associated with

the body composition of the child acquired by the body composition acquiring means and an indicator indicating the level of the growth of the child which corresponds to a body composition determination standard (which shows proper grades for values associated with the body composition of children as a plurality of ranges according to an indicator indicating the level of the growth of children based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges) selected by the body composition determination standard selecting means out of different indicators indicating the level of the growth of the child acquired by the growth indicator acquiring means, by referring to the body composition determination standard selected by the body composition determination standard selecting means. Thus, the degree of freedom in desired determination is increased, and data about the determination can be acquired more conveniently.

**[0035]** Further, the determination object selecting means selects a value associated with the body composition of the child which is to be acquired by the body composition acquiring means, and the body composition acquiring means acquires the selected value associated with the body composition of the child. Thus, the degree of freedom in desired determination is increased, and data about the determination can be acquired more conveniently.

**[0036]** Further, the determination result displaying means displays history graphs in turn, the history graphs each comprising a time axis and a body composition value axis, the history graphs showing the current value associated with the body composition of the child together with past values associated with the body composition of the child such that the current value is positioned in the center of the time axis, one history graph showing a transition of the values by weeks, another history graph showing the transition of the values by months, the other history graph showing the transition of the values by years. Thus, a subject can know the transition of the data more conveniently.

**[0037]** Further, the abrupt change warning means gives a warning when the amount of change between the current value associated with the body composition of a child and past values associated with the body composition of the child is larger than a predetermined range value. Thus, a subject can know an abrupt change in a body more conveniently, and the body composition meter of the present invention can be used for giving advice about nutrition or exercise accordingly.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0038]**

Fig. 1 is external views of a body composition meter

with a function of determining the body compositions of children according to the present invention, wherein A is a plan view thereof, B is a side view thereof, and C is a front view thereof.

Fig. 2 is a block diagram illustrating the overall constitution of the body composition meter with a function of determining the body compositions of children according to the present invention.

Fig. 3 is a flowchart showing a flow of the operations of the body composition meter with a function of determining the body compositions of children according to the present invention.

Fig. 4 is a diagram showing age-based body fat percentage determination reference tables, wherein A is a table for boys and B is a table for girls.

Fig. 5 is a diagram showing age-based body fat percentage determination graph data, wherein A is data for boys and B is data for girls.

Fig. 6 is a diagram showing age-based fat free percentage determination reference tables, wherein A is a table for boys and B is a table for girls.

Fig. 7 is a diagram showing age-based fat free percentage determination graph data, wherein A is data for boys and B is data for girls.

Fig. 8 is a diagram showing body-height-based body fat percentage determination graph data, wherein A is data for boys and B is data for girls.

Fig. 9 is a diagram showing a display section displaying a screen for setting personal data.

Fig. 10 is a diagram showing the display section displaying a screen for displaying results such as measurement data.

Fig. 11 is a weekly basis history graph.

Fig. 12 is a monthly basis history graph.

Fig. 13 is a yearly basis history graph.

Fig. 14 is a diagram showing the display section displaying the screen for displaying results such as measurement data in another mode.

Fig. 15 is a diagram showing the display section displaying the screen for displaying results such as measurement data in still another embodiment.

Fig. 16 is a diagram showing other age-based body fat percentage determination reference tables, wherein A is a table for boys and B is a table for girls.

Fig. 17 is a diagram showing other age-based body fat percentage determination graph data, wherein A is data for boys and B is data for girls.

Fig. 18 is a diagram showing other age-based fat free percentage determination reference tables, wherein A is a table for boys and B is a table for girls.

Fig. 19 is a diagram showing other age-based fat free percentage determination graph data, wherein A is data for boys and B is data for girls.

Fig. 20 is a diagram showing other body-height-based body fat percentage determination graph data, wherein A is data for boys and B is data for girls.

Fig. 21 is another weekly basis history graph.

Fig. 22 is another monthly basis history graph.

Fig. 23 is another yearly basis history graph.

Fig. 24 is a diagram showing a part of the display section of another embodiment, displaying a screen for displaying results such as measurement data.

Fig. 25 is a diagram showing other age-based body fat percentage determination reference tables, wherein A is a table for boys and B is a table for girls.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0039]** As a first embodiment, a body composition meter having a function of determining the body compositions of children according to the present invention comprises determination object selecting means, body composition acquiring means, growth indicator acquiring means, child body composition determination standard storing means, child body composition determining means, determination result displaying means, and abrupt change warning means. The terms "child" and "children" used in the description of the present specification refer to those of age 17 or younger. Further, the term "acquiring" used herein refers to acquiring by input and measurement, acquiring solely by input or acquiring solely by measurement.

**[0040]** The determination object selecting means selects a value (e.g., a body fat percentage, a fat free percentage or a muscle percentage) associated with the body composition of a child which is to be acquired by the body composition acquiring means.

**[0041]** The body composition acquiring means acquires the value (e.g., a body fat percentage, a fat free percentage or a muscle percentage) associated with the body composition of the child selected by the determination object selecting means.

**[0042]** The growth indicator acquiring means acquires an indicator (e.g., age or a body height) indicating the level of the growth of the child.

**[0043]** The child body composition determination standard storing means stores a body composition determination standard showing proper grades for values (e.g., a body fat percentage, a fat free percentage or a muscle percentage) associated with the body composition of children as a plurality of ranges according to an indicator (e.g., age or a body height) indicating the level of the growth of children based on an obesity determination standard showing proper grades for values (e.g., the degree of obesity, a BMI (Body Mass Index) or a Rohrer index) associated with the obesity of children as a plurality of ranges.

**[0044]** The child body composition determining means determines a proper grade for the value (e.g., a body fat percentage, a fat free percentage or a muscle percentage) associated with the body composition of the child which corresponds to the value acquired by the body composition acquiring means and the indicator acquired by the growth indicator acquiring means by referring to

the body composition determination standard stored in the child body composition determination standard storing means.

**[0045]** The determination result displaying means displays the result of the proper grade for the value associated with the body composition of the child determined by the child body composition determining means. Further, the determination result displaying means also displays history graphs in turn, the history graphs each comprising a time axis and a body composition value axis, the history graphs showing the current value associated with the body composition of the child together with past values associated with the body composition of the child such that the current value is positioned in the center of the time axis, one history graph showing a transition of the values by weeks, another history graph showing the transition of the values by months, the other history graph showing the transition of the values by years.

**[0046]** The abrupt change warning means gives a warning when the amount of change between the current value associated with the body composition of the child acquired by the body composition acquiring means and the past values associated with the body composition of the child is larger than a predetermined range value. The term "predetermined range value" refers to a range value at which a change in value associated with body composition may occur in a normal growth.

**[0047]** According to the thus constituted body composition meter having a function of determining the body compositions of children, the child body composition determining means determines a proper grade for a value associated with the body composition of a child which corresponds to the value associated with the body composition of the child acquired by the body composition acquiring means and an indicator indicating the level of the growth of the child acquired by the growth indicator acquiring means by referring to a body composition determination standard (which shows proper grades for values associated with the body composition of children as a plurality of ranges according to an indicator indicating the level of the growth of children based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges) stored in the child body composition determination standard storing means. Thus, a subject can conveniently acquire highly reliable data about determination of a proper grade for the body composition of the child.

**[0048]** In the above description, when the value associated with obesity is a BMI (Body Mass Index) which is determined by an equation that takes only the body weight and body height of the child as parameters as shown by body weight (kg)/body height (m)<sup>2</sup>, determination of the proper grade for the body composition of the child becomes highly reliable. When it is the degree of obesity which is determined by an equation that does not take parameters such as a body height which show a large individual difference in physical change in a growth period but takes only a body weight which reflects obesity

as a parameter as shown by (body weight (kg) - standard body weight (kg))/standard body weight (kg) x 100, determination of the proper grade for the body composition of the child becomes particularly highly reliable.

**[0049]** Further, the determination object selecting means selects a value associated with the body composition of the child which is to be acquired by the body composition acquiring means, and the body composition acquiring means acquires the selected value associated with the body composition of the child. Thus, the degree of freedom in desired determination is increased, and data about the determination can be acquired more conveniently.

**[0050]** Further, the determination result displaying means displays history graphs in turn, the history graphs each comprising a time axis and a body composition value axis, the history graphs showing the current value associated with the body composition of the child together with past values associated with the body composition of the child such that the current value is positioned in the center of the time axis, one history graph showing a transition of the values by weeks, another history graph showing the transition of the values by months, the other history graph showing the transition of the values by years. Thus, a subject can know the transition of the data more conveniently.

**[0051]** Further, the abrupt change warning means gives a warning when the amount of change between the current value associated with the body composition of a child and past values associated with the body composition of the child is larger than a predetermined range value. Thus, a subject can know an abrupt change in a body more conveniently.

**[0052]** As a second embodiment, a body composition meter having a function of determining the body compositions of children according to the present invention comprises determination object selecting means, body composition acquiring means, growth indicator acquiring means, child body composition determination standard storing means, body composition determination standard selecting means, child body composition determining means, determination result displaying means, and abrupt change warning means.

**[0053]** The growth indicator acquiring means acquires different indicators (e.g., age and a body height) indicating the level of the growth of the child.

**[0054]** The child body composition determination standard storing means stores a plurality of body composition determination standards showing proper grades for values associated with the body composition of children as a plurality of ranges according to an indicator (e.g., age or a body height) indicating the level of the growth of children based on an obesity determination standard showing proper grades for values (e.g., the degree of obesity, a BMI (Body Mass Index) or a Rohrer index) associated with the obesity of children as a plu-

ality of ranges, for each of the different indicators (e.g., age and a body height) indicating the level of the growth of the child.

**[0055]** The body composition determination standard selecting means selects a body composition determination standard from the body composition determination standards stored in the child body composition determination standard storing means.

**[0056]** The child body composition determining means determines a proper grade for the value (e.g., a body fat percentage, a fat free percentage or a muscle percentage) associated with the body composition of the child which corresponds to the value (e.g., a body fat percentage, a fat free percentage or a muscle percentage) acquired by the body composition acquiring means and the indicator (e.g., age or a body height) corresponding to the body composition determination standard selected by the body composition determination standard selecting means out of the different indicators acquired by the growth indicator acquiring means, by referring to the body composition determination standard selected by the body composition determination standard selecting means.

**[0057]** Descriptions of the determination object selecting means, the body composition acquiring means, the determination result displaying means and the abrupt change warning means will be omitted since these are the same as those in the first embodiment.

**[0058]** According to the thus constituted body composition meter having a function of determining the body compositions of children, the child body composition determining means determines a proper grade for the value associated with the body composition of the child which corresponds to the value acquired by the body composition acquiring means and the indicator corresponding to the body composition determination standard selected by the body composition determination standard selecting means out of the different indicators acquired by the growth indicator acquiring means, by referring to the body composition determination standard (which shows proper grades for values associated with the body composition of children as a plurality of ranges according to an indicator indicating the level of the growth of children based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges) selected by the body composition determination standard selecting means.

**[0059]** Hereinafter, an example (body composition meter with a function of determining the body compositions of children of ages 6 to 17) in the above embodiment will be described specifically.

#### Examples

**[0060]** First, the specific constitution of a body composition meter with a function of determining the body compositions of children according to the present invention will be described by use of an external view shown in Fig.



1 and a block diagram shown in Fig. 2.

**[0061]** The body composition meter according to the present invention comprises a power supply 1, a start switch 2, a setting key 3, an alteration key 4, a graph switching key 5, a bioelectrical impedance measuring section 11, a body weight measuring section 21, an EEPROM 6, a display section 31, and a microcomputer 7.

**[0062]** The power supply 1 is provided in a base 26 and supplies electric power to the sections constituting the electrical system of the present device.

**[0063]** The start switch 2 is provided on a side surface of the base 26 and supplies electric power from the power supply 1 to activate the present device.

**[0064]** The setting key 3 is provided on the top surface of a platform 27 and sets display of selected numerical values, characters or the like, storage of measurement data, and the like.

**[0065]** The alteration key 4 is provided on the top surface of the platform 27 and switches display of selected numerical values, characters or the like.

**[0066]** The graph switching key 5 is provided on the top surface of the platform 27 and switches among weekly basis, monthly basis and yearly basis history graphs to be displayed in the display section 31 (LCD 32) in turn.

**[0067]** The bioelectrical impedance measuring section 11 comprises a current supplying circuit 12, current passing electrodes 13, measuring electrodes 14 and a voltage detecting circuit 15 and measures a voltage generated based on a bioelectrical impedance. The current supplying circuit 12 is provided in the base 26 and generates a current to be passed through a body under the control of the microcomputer 7. The current passing electrodes 13 are provided on the top surface of the platform 27 so as to make contact with the bottoms of the feet, and a current is passed through the body from one current passing electrode 13 to the other current passing electrode 13. The measuring electrodes 14 are provided on the top surface of the platform 27 so as to make contact with the bottoms of the feet and detects a voltage generated based on a bioelectrical impedance in the body by the current passed from one current passing electrode 13 to the other current passing electrode 13. The voltage detecting circuit 15 is provided in the base 26 and amplifies and digitizes the detected voltage generated based on the bioelectrical impedance in the body.

**[0068]** The body weight measuring section 21 comprises a weight sensor 22 and a detection circuit 23 and measures a body weight when a subject stands on the platform 27. The weight sensor 22 is provided in the base 26 and detects a voltage generated based on the body weight when the subject stands on the platform 27. The detection circuit 23 is provided in the base 26 and amplifies and digitizes the detected voltage generated based on the body weight.

**[0069]** The EEPROM 6 is provided in the base 26 and stores measurement data set by means of the setting key 3 and various other data.

**[0070]** The display section 31 comprises an LCD 32

and LEDs 33. The display section 31 is provided on the top surface of the platform 27 and displays an input status, measurement results, warning messages and other data.

**[0071]** The microcomputer 7 comprises a CPU, a ROM which stores programs for control and computation, computing equations for computing a body fat percentage and a fat free mass, computing equations for computing the amount of change in the body fat percentage and the fat free mass, body composition determination reference tables and determination graph data, a RAM which stores computation results and personal data temporarily, a timer, and an I/O port. The microcomputer 7 is provided in the base 26 and executes processes such as control associated with determination of a proper grade for a value associated with the body composition of a child, determination of an abrupt change in body fat percentage or fat free mass and release of a warning about the abrupt change, and the like.

**[0072]** The body composition determination reference tables are a body fat percentage determination reference table showing proper grades (under, -healthy, +healthy, over, obese) for the body fat percentage of children as a plurality of ranges according to the ages of children based on an obesity determination standard showing proper grades for the degree of obesity ( $= (\text{body weight (kg)} - \text{standard body weight (kg)}) / \text{standard body weight (kg)} \times 100$ ) of child as a plurality of ranges (refer to Fig. 4), a fat free percentage determination reference table showing proper grades (high, +healthy, -healthy, slightly low, low) for the fat free percentage of children as a plurality of ranges according to the ages of children based on the obesity determination standard showing the proper grades for the degree of obesity of child as a plurality of ranges (refer to Fig. 6), a body fat percentage determination reference table showing proper grades (under, -healthy, +healthy, over, obese) for the body fat percentage of children as a plurality of ranges according to the body heights of children based on the obesity determination standard showing the proper grades for the degree of obesity of child as a plurality of ranges (not shown), and a fat free percentage determination reference table showing proper grades (high, +healthy, -healthy, slightly low, low) for the fat free percentage of children as a plurality of ranges according to the body heights of children based on the obesity determination standard showing the proper grades for the degree of obesity of child as a plurality of ranges (not shown). As the obesity determination standard showing the proper grades for the degree of obesity of child as a plurality of ranges, a body shape determination standard (JASSO) based on the degree of obesity of schoolchildren which determines a child with a degree of obesity of +50 or higher to be highly obese, a child with a degree of obesity of not lower than +30% and lower than +50% to be moderately obese, a child with a degree of obesity of not lower than +20% and lower than +30% to be over, a child with a degree of obesity of not lower than -20% and lower than +20% to be healthy,

and a child with a degree of obesity of lower than -20% to be under is used.

**[0073]** Further, the determination graph data are graphs of the above body composition determination reference tables (refer to Figs. 5, 7 and 8) .

**[0074]** The setting key 3, the alteration key 4 and the microcomputer 7 constitute determination object selecting means, body composition determination standard selecting means, and growth indicator acquiring means. The bioelectrical impedance measuring section 11 and the microcomputer 7 constitute body composition acquiring means. The microcomputer 7 constitutes child body composition determination standard storing means and child body composition determining means. The display section 31 and the microcomputer 7 constitute determination result displaying means and abrupt change warning means.

**[0075]** Next, the operation of the body composition meter having a function of determining the body compositions of children according to the present invention will be described by use of a flowchart shown in Fig. 3.

**[0076]** First, when a subject presses the start switch 2, the power supply 1 supplies electric power to the sections constituting the electrical system (STEP S1) so as to activate the device (STEP S2).

**[0077]** Then, when the subject presses the setting key 3 (YES in STEP S2), the LCD 32 displays a screen for setting personal data as shown in Fig. 9. Then, the subject alters and sets each of items (measurement date, sex, birth date, age, body height, determination axis, and measuring object) on the screen for setting personal data by use of the alteration key 4 and the setting key 3, and the EEPROM 6 stores each of the altered and set items (STEP S3). More specifically, when the screen for setting personal data is displayed, a cursor is positioned in the "measurement date" field first, and the date is altered by pressing the alteration key 4 and set by pressing the setting key 3. Then, the cursor moves to the "sex" field, and the sex is switched between a male and a female by pressing the alteration key 4 and set by pressing the setting key 3. Then, the cursor moves to the "birth date" field, and the birth date is altered by pressing the alteration key 4 and set by pressing the setting key 3. Then, the cursor moves to the "age" field, and the age is altered within a range of 6 to 17 years old by pressing the alteration key 4 and set by pressing the setting key 3. Then, the cursor moves to the "body height" field, and the body height is altered by pressing the alteration key 4 and set by pressing the setting key 3. Then, the cursor moves to the "determination axis" field, and the determination axis is switched between age and a body height by pressing the alteration key 4 and set by pressing the setting key 3. Then, the cursor moves to the "measuring object" field, and the measuring object is switched between a body fat percentage and a fat free percentage by pressing the alteration key 4 and set (i.e. stored in the EEPROM 6) by pressing the setting key 3. Thereby, the screen for setting personal data is switched to a measurement

screen.

**[0078]** Then, when the subject does not press the setting key 3 in STEP S2 (NO in STEP S2) or stands on the platform 27 after STEP S3, the body weight and bioelectrical impedance of the subject are measured in the body weight measuring section 21 and the bioelectrical impedance measuring section 11, respectively (STEP S4), and in the microcomputer 7, current measurement data of the measuring object (body fat percentage or fat free percentage) set on the screen for setting personal data is calculated by use of the computing equation for computing a body fat percentage or a fat free percentage based on the above measured body weight and bioelectrical impedance. Then, in the microcomputer 7, a proper grade for the current measurement data (body fat percentage or fat free percentage) is determined by use of a body composition determination reference table corresponding to the sex, determination axis and measuring object set on the screen for setting personal data (i.e. one of an age-based body fat percentage determination reference table for males, an age-based body fat percentage determination reference table for females, an age-based fat free percentage determination reference table for males, an age-based fat free percentage determination reference table for females, a body-height-based body fat percentage determination reference table for males, a body-height-based body fat percentage determination reference table for females, a body-height-based fat free percentage determination reference table for males, and a body-height-based fat free percentage determination reference table for females) (STEP S5).

**[0079]** Then, in the microcomputer 7, the difference between the above-calculated current measurement data (body fat percentage or fat free percentage) and past measurement data (average of past data on a month ago) stored in the EEPROM 6 is calculated, and it is determined whether the difference is larger than a predetermined range value (standard deviation value (1SD) for the average of past data on a month ago) (STEP S6).

**[0080]** Then, as shown in Fig. 10, the LCD 32 displays some of the items set on the screen for setting personal data and the current measurement data. The upper LED 33 lights in color corresponding to the above determined proper grade for the current measurement data (body fat percentage or fat free percentage) (i.e. blue for under or high, yellowish green for -healthy, green for +healthy, orange for over or slightly low, and red for obese or low), and the lower LED 33 blinks in red only when the above determined difference is larger than the standard deviation value (1SD) (STEP S7) .

**[0081]** Then, with the LCD 32 displaying some of the items set on the screen for setting personal data and the current measurement data (STEP S8), when the graph switching key 5 is pressed (YES in STEP S8), the LCD 32 displays the current measurement data in the center of the time axis on the screen, in a history graph whose graduation lines represent weeks, the history graph

showing measurement data averaged by weeks based on stored past measurement data and the current measurement data and showing proper grades for the measurement data as a plurality of ranges based on determination graph data, as shown in Fig. 11. Then, when the graph switching key 5 is pressed, the LCD 32 displays the current measurement data in the center of the time axis on the screen, in a history graph whose graduation lines represent months, the history graph showing measurement data averaged by months based on the stored past measurement data and the current measurement data and showing the proper grades for the measurement data as a plurality of ranges based on the determination graph data, as shown in Fig. 12. Then, when the graph switching key 5 is pressed, the LCD 32 displays the current measurement data in the center of the time axis on the screen, in a history graph whose graduation lines represent years, the history graph showing measurement data averaged by years based on the stored past measurement data and the current measurement data and showing the proper grades for the measurement data as a plurality of ranges based on the determination graph data, as shown in Fig. 13 (STEP S9).

**[0082]** Then, when the graph switching key 5 is not pressed in STEP S8 (NO in STEP S8) or when the setting key 3 is pressed (YES in STEP S10) after STEP S9 (STEP S10), the EEPROM 6 stores the current measurement data as past measurement data continuously (STEP S11).

**[0083]** Then, after a certain period of time has elapsed without pressing the graph switching key 5 (NO in STEP S10) or after STEP S11, the power supply 1 stops supplying electric power to the sections constituting the electrical system, thereby deactivating the device (STEP S12).

**[0084]** An example of the body composition meter with a function of determining the body compositions of children according to the present invention is constituted as described above.

**[0085]** In the above example, the various body composition determination reference tables are based on the obesity determination standard showing proper grades for the degree of obesity of child as a plurality of ranges. However, the body composition determination reference tables may also be based on an obesity determination standard showing proper grades for the BMI (= body weight (kg) / body height (m)<sup>2</sup>) of child as a plurality of ranges or an obesity determination standard showing proper grades for the Rohrer index (= body weight (kg) / (body height (cm)<sup>3</sup> × 10<sup>7</sup>) of child as a plurality of ranges.

**[0086]** Further, in the above example, the measuring objects are a body fat percentage and a fat free percentage. However, the measuring object may also be a muscle percentage.

**[0087]** Further, the result of determination of the proper grade for the current measurement data is indicated by lighting the upper LED 33 in color corresponding to the proper grade as shown in Fig. 10. In addition, it is also

possible to display the corresponding proper grade on the LCD 32 together with some of the items set on the screen for setting personal data and the current measurement data as shown in Fig. 14, to light the corresponding section in a bar graph sectioned according to the proper grades as shown in Fig. 15, or to sound a buzzer.

**[0088]** Further, in the above example, the body shape determination standard (JASSO) based on the degree of obesity of schoolchildren is used as the obesity determination standard showing proper grades for the degree of obesity of child as a plurality of ranges, because the present device is intended for children of ages 6 to 17. However, in the case of a body composition meter having a function of determining the body compositions of children of age 6 or younger, a body shape determination standard (JASSO) for small children (age 6 or younger) which determines the degree of obesity on the basis of +15% can be used, for example.

**[0089]** Further, in the above example, age is entered when the data are entered or altered on the screen for setting personal data (STEP S3). However, it is also possible that age is not entered but calculated by the microcomputer from the entered measurement date and the entered birth date.

**[0090]** Further, in the above example, as the body composition determination reference tables, the body fat percentage determination reference tables (for Japanese) shown in Fig. 4 and the fat free percentage determination reference tables (for Japanese) shown in Fig. 6 are used. It is also possible to use body fat percentage determination reference tables (for Japanese) shown in Fig. 16, fat free percentage determination reference tables (for Japanese) shown in Fig. 18, and body fat percentage determination reference tables (for Westerners) shown in Fig. 25. Further, in the above example, as the determination graph data, the body fat percentage determination graph data shown in Fig. 5, the fat free percentage determination graph data shown in Fig. 7 and the body fat percentage determination graph data shown in Fig. 8 are used. It is also possible to use body fat percentage determination graph data shown in Fig. 17, fat free percentage determination graph data shown in Fig. 19 and body fat percentage determination graph data shown in Fig. 20. Further, the bar graph (LED 33) shown in Fig. 15 may have symbols which cause a subject to image proper grades (under, healthy, over, obese) for a body fat percentage as shown in Fig. 24.

**[0091]** Next, a description will be given to the reason why the body composition determination reference tables (Figs. 16 and 18) and the determination graph data (Figs. 17, 19 and 20) have different borderlines from those of the body composition determination reference tables (Figs. 4 and 6) and the determination graph data (Figs. 5, 7 and 8).

**[0092]** As in the case of the body composition determination reference tables (Figs. 4 and 6) and the determination graph data (Figs. 5, 7 and 8), the body composition determination reference tables (Figs. 16 and 18)

and the determination graph data (Figs. 17, 19 and 20) show proper grades (under, -healthy, +healthy, over, obese) for a value associated with the body composition (body fat percentage or fat free percentage) of children as a plurality of ranges according to an indicator (age or body height) indicating the level of the growth of children based on an obesity determination standard (which determines a child with a degree of obesity of +50% or higher to be highly obese, a child with a degree of obesity of not lower than +30% and lower than +50% to be moderately obese, a child with a degree of obesity of not lower than +20% and lower than +30% to be over, a child with a degree of obesity of not lower than -20% and lower than +20% to be healthy, and a child with a degree of obesity of lower than -20% to be under) showing proper grades for the degree of obesity (= (body weight (kg) - standard body weight (kg))/standard body weight (kg) x 100) of children as a plurality of ranges.

**[0093]** More specifically, the body composition determination reference tables and the determination graph data are prepared as follows. First, values (body fat percentage and fat free percentage) associated with body composition and the degree of obesity are measured for each of a number of children. Then, for each sex, correlation equations between the values associated with body composition and the degree of obesity are determined according to indicators (age and body height) indicating the level of the growth of children (at intervals of 1 age or at intervals of 5 cm in body height). Then, from these correlation equations, values associated with body composition which correspond to the obesity degree borderlines (+50%, +30%, +20%, -20%) of the obesity determination standard are determined. Then, for each sex, these determined values associated with body composition according to the indicators indicating the level of the growth of children are plotted on axes representing the relationships between the values associated with body composition and the indicators indicating the level of the growth of children so as to prepare graphs. The thus obtained graph data are the determination graph data, and tables prepared from the determination graph data are the body composition determination reference tables.

**[0094]** In such a process, when the body composition determination reference tables (Figs. 16 and 18) and the determination graph data (Figs. 17, 19 and 20) are determined, the values associated with body composition are determined to have higher estimation accuracy than when the body composition determination reference tables (Figs. 4 and 6) and the determination graph data (Figs. 5, 7 and 8) are determined. This is the reason why they have different borderlines.

## Claims

1. A body composition meter having a function of determining the body compositions of children, comprising:

body composition acquiring means,  
growth indicator acquiring means,  
child body composition determination standard storing means,  
child body composition determining means, and  
determination result displaying means,  
wherein

the body composition acquiring means acquires a value associated with the body composition of a child,

the growth indicator acquiring means acquires an indicator indicating the level of the growth of the child,

the child body composition determination standard storing means stores a body composition determination standard showing proper grades for values associated with the body composition of children as a plurality of ranges according to an indicator indicating the level of the growth of children based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges,

the child body composition determining means determines a proper grade for the value associated with the body composition of the child which corresponds to the value acquired by the body composition acquiring means and the indicator acquired by the growth indicator acquiring means by referring to the body composition determination standard stored in the child body composition determination standard storing means, and

the determination result displaying means displays the result of the proper grade for the value associated with the body composition of the child determined by the child body composition determining means.

2. The body composition meter of claim 1, further comprising:

determination object selecting means,  
wherein

the determination object selecting means selects a value associated with the body composition of the child which is to be acquired by the body composition acquiring means, and  
the body composition acquiring means acquires the value associated with the body composition of the child selected by the determination object selecting means.

3. The body composition meter of claim 1 or 2, wherein the determination result displaying means displays history graphs in turn,  
the history graphs each comprising a time axis and a body composition value axis,

- the history graphs showing the current value associated with the body composition of the child together with past values associated with the body composition of the child such that the current value is positioned in the center of the time axis, 5  
 one history graph showing a transition of the values by weeks, another history graph showing the transition of the values by months, 10  
 the other history graph showing the transition of the values by years.
4. The body composition meter of any one of claims 1 to 3, further comprising:
- abrupt change warning means, 15  
 wherein  
 the abrupt change warning means gives a warning when the amount of change between the current value associated with the body composition of the child acquired by the body composition acquiring means and the past values associated with the body composition of the child is larger than a predetermined range value. 20
5. The body composition meter of any one of claims 1 to 4, wherein the indicator indicating the level of the growth of the child is age. 25
6. The body composition meter of claim 5, wherein the body composition determination standard shows proper grades for values associated with the body composition of children as a plurality of ranges at a 1-age interval based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges. 30 35
7. The body composition meter of any one of claims 1 to 4, wherein the indicator indicating the level of the growth of the child is a body height. 40
8. The body composition meter of claim 7, wherein the body composition determination standard shows proper grades for values associated with the body composition of children as a plurality of ranges at intervals of 5 cm in body height based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges. 45
9. A body composition meter having a function of determining the body compositions of children, comprising:
- body composition acquiring means, 55  
 growth indicator acquiring means,  
 child body composition determination standard storing means,
- body composition determination standard selecting means,  
 child body composition determining means, and  
 determination result displaying means,  
 wherein  
 the body composition acquiring means acquires a value associated with the body composition of a child,  
 the growth indicator acquiring means acquires different indicators indicating the level of the growth of the child,  
 the child body composition determination standard storing means stores a plurality of body composition determination standards showing proper grades for values associated with the body composition of children as a plurality of ranges according to an indicator indicating the level of the growth of children based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges, for each of the different indicators indicating the level of the growth of the child,  
 the body composition determination standard selecting means selects a body composition determination standard from the body composition determination standards stored in the child body composition determination standard storing means,  
 the child body composition determining means determines a proper grade for the value associated with the body composition of the child which corresponds to the value acquired by the body composition acquiring means and the indicator corresponding to the body composition determination standard selected by the body composition determination standard selecting means out of the different indicators acquired by the growth indicator acquiring means, by referring to the body composition determination standard selected by the body composition determination standard selecting means, and  
 the determination result displaying means displays the result of the proper grade for the value associated with the body composition of the child determined by the child body composition determining means.
10. The body composition meter of claim 9, further comprising:
- determination object selecting means,  
 wherein  
 the determination object selecting means selects a value associated with the body composition of the child which is to be acquired by the body composition acquiring means, and  
 the body composition acquiring means acquires

the value associated with the body composition of the child selected by the determination object selecting means.

11. The body composition meter of claim 9 or 10, wherein the determination result displaying means displays history graphs in turn,  
the history graphs each comprising a time axis and a body composition value axis,  
the history graphs showing the current value associated with the body composition of the child together with past values associated with the body composition of the child such that the current value is positioned in the center of the time axis,  
one history graph showing a transition of the values by weeks, another history graph showing the transition of the values by months,  
the other history graph showing the transition of the values by years.  
20
12. The body composition meter of any one of claims 9 to 11, further comprising:  
  
abrupt change warning means,  
wherein  
the abrupt change warning means gives a warning when the amount of change between the current value associated with the body composition of the child acquired by the body composition acquiring means and the past values associated with the body composition of the child is larger than a predetermined range value.  
25
13. The body composition meter of any one of claims 9 to 12, wherein the different indicators indicating the level of the growth of the child are age and a body height.  
35
14. The body composition meter of claim 13, wherein the body composition determination standards show proper grades for values associated with the body composition of children as a plurality of ranges at a 1-age interval based on an obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges and show proper grades for values associated with the body composition of children as a plurality of ranges at intervals of 5 cm in body height based on the obesity determination standard showing proper grades for values associated with the obesity of children as a plurality of ranges.  
40  
45  
50
15. The body composition meter of any one of claims 1 to 14, wherein the value associated with the body composition is a fat free percentage, a body fat percentage or a muscle percentage.  
55
16. The body composition meter of any one of claims 1

to 15, wherein the value associated with the obesity is the degree of obesity, a BMI or a Rohrer index.

17. The body composition meter of any one of claims 1 to 16, wherein the body composition determination standard is intended for children of ages 5 to 18.
18. The body composition meter of any one of claims 1 to 16, wherein the body composition determination standard is intended for children of ages 6 to 17.

FIG. 1A

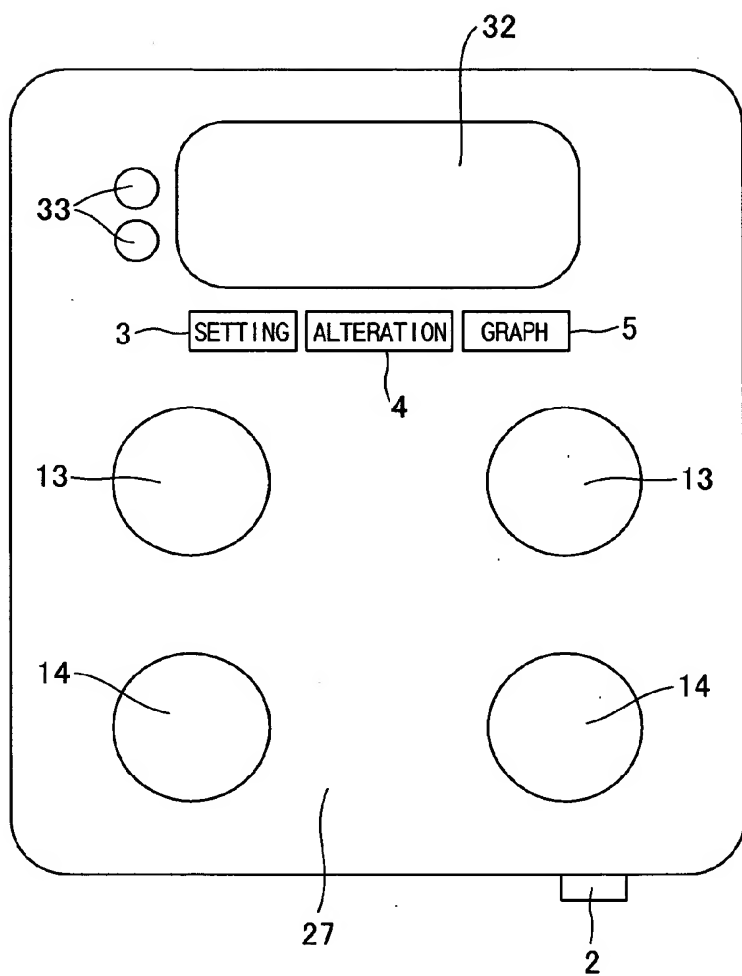


FIG. 1B

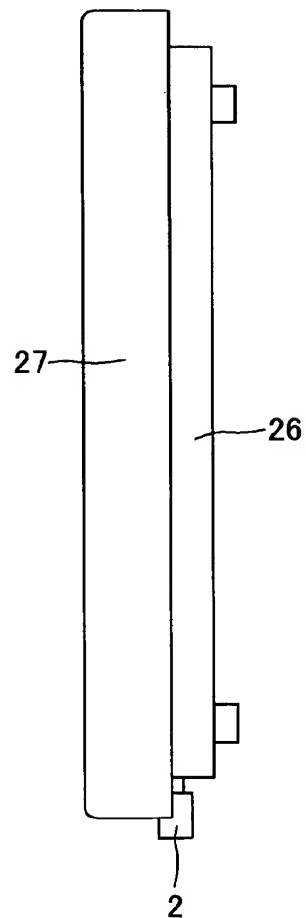
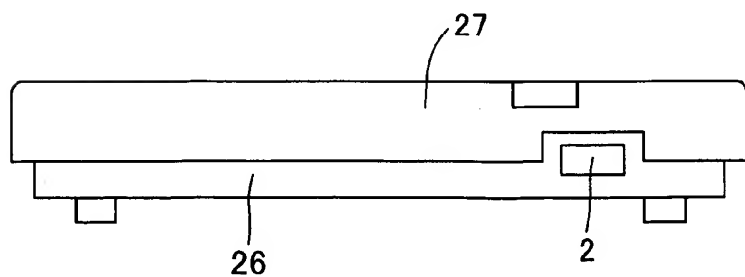


FIG. 1C



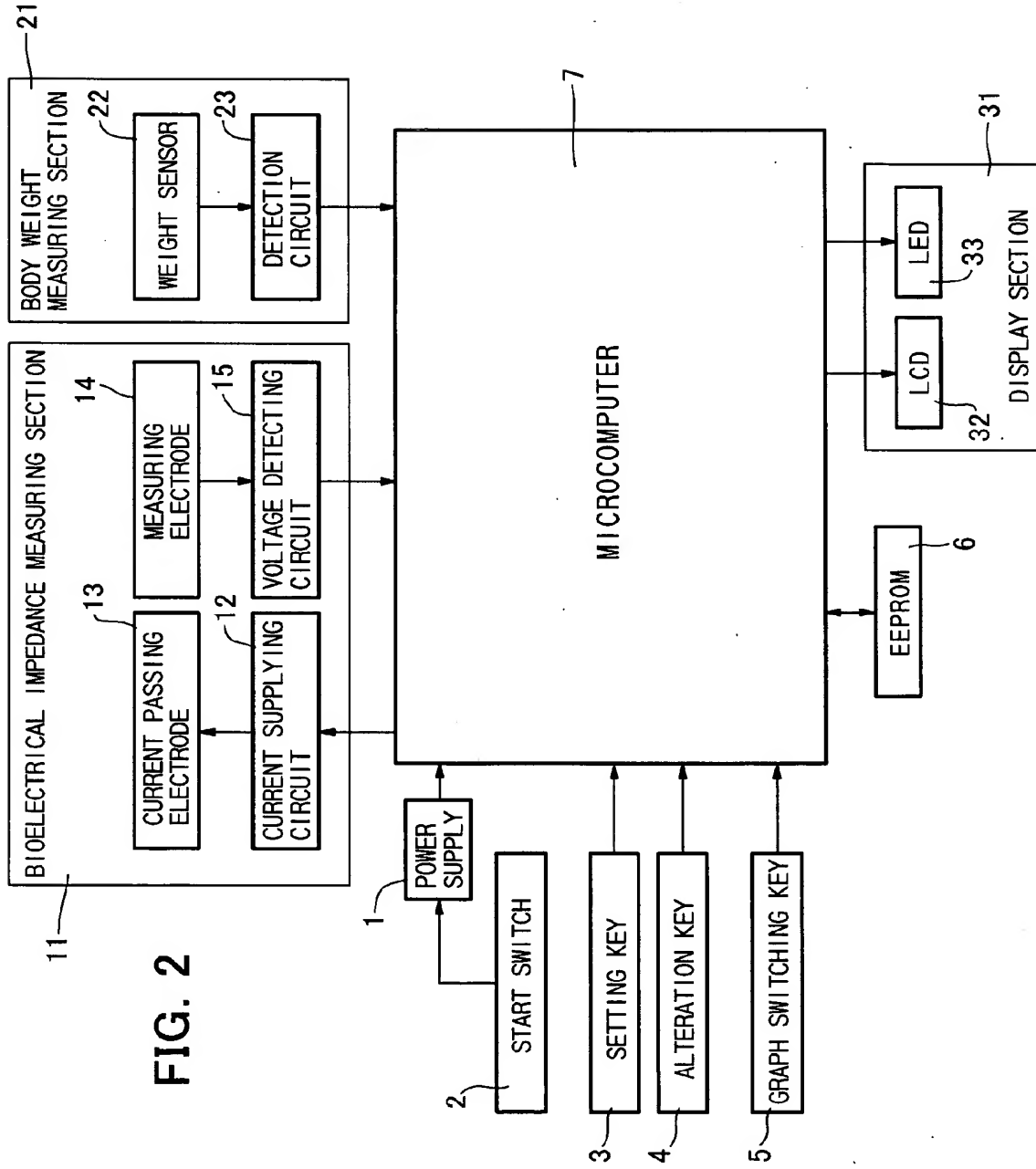




FIG. 3

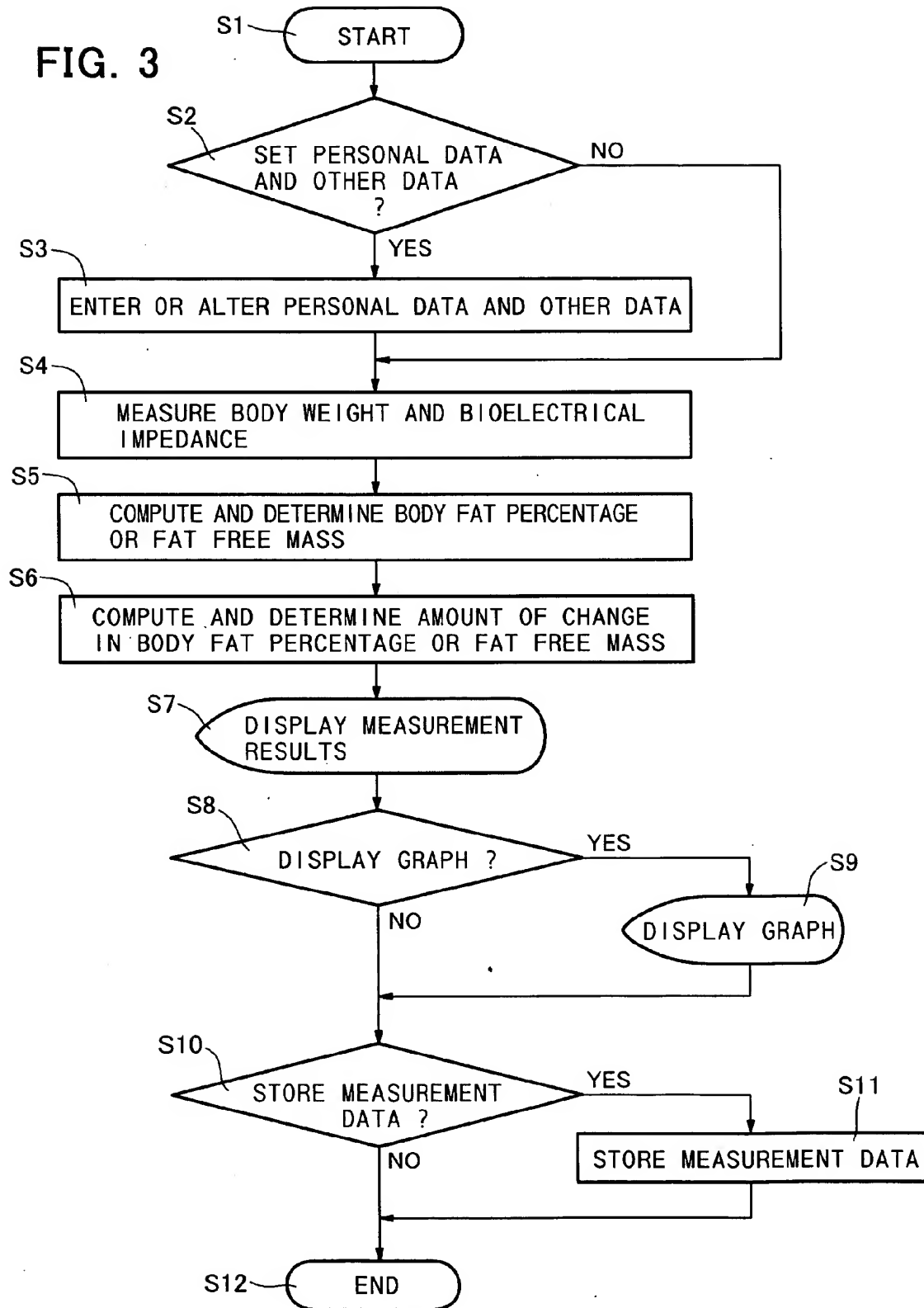


FIG. 4A

BOY	BODY FAT PERCENTAGE																																												
6 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
7 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
8 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
9 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
10 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
11 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
12 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
13 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
15 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
16 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
17 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
	UNDER					-HEALTHY					+HEALTHY					OVER					OBESE																								



FIG. 5A

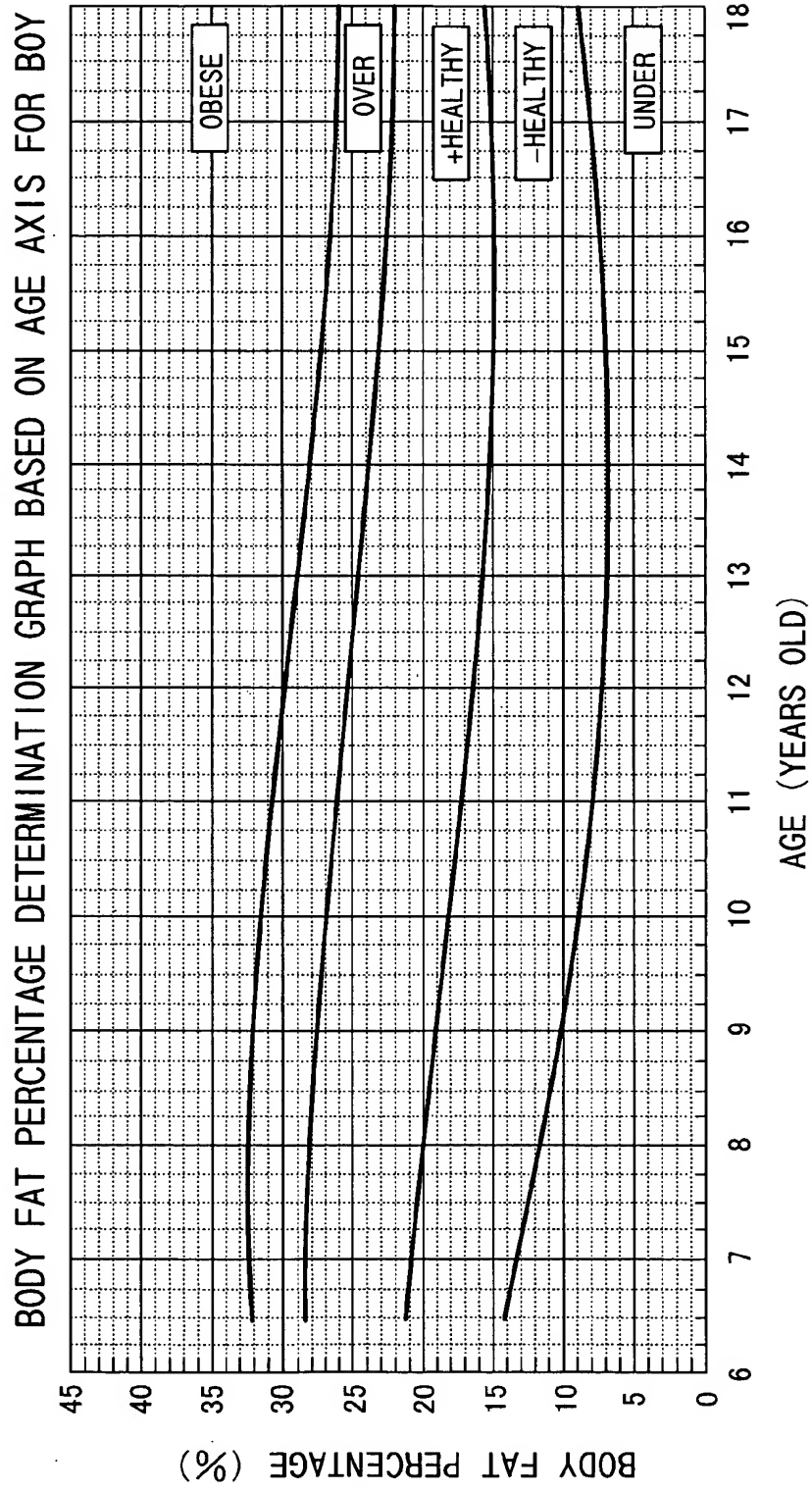


FIG. 5B

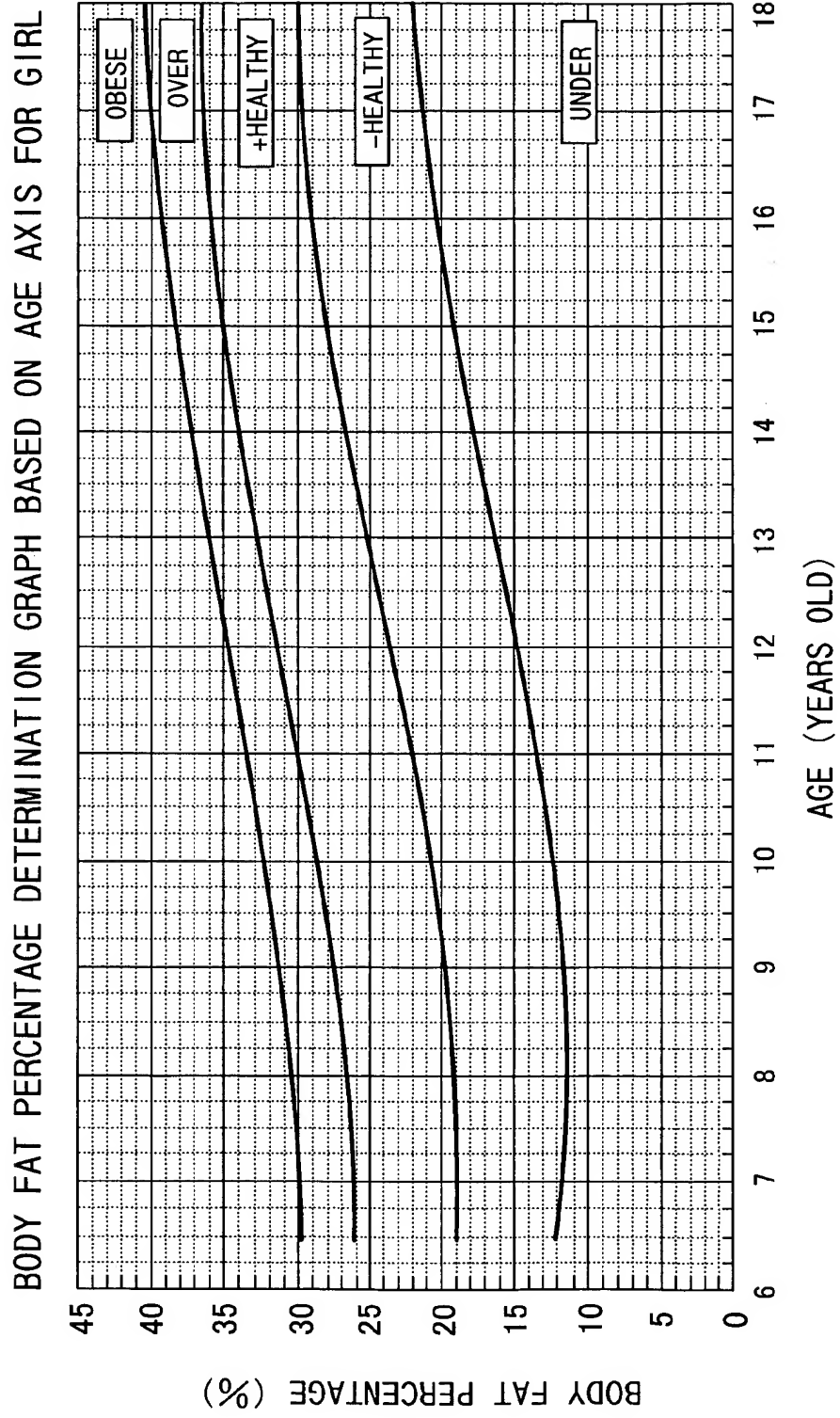


FIG. 6A

BOY	FAT FREE PERCENTAGE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
6 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
7 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
8 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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10 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
11 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
12 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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14 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
15 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
16 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
17 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	HIGH				+HEALTHY				-HEALTHY				SLIGHTLY LOW				LOW																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

FIG. 6B

GIRL	FAT FREE PERCENTAGE																																												
6 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
7 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
8 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
9 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
10 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
11 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
12 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
13 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
14 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
15 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
16 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
17 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
	HIGH										+HEALTHY										-HEALTHY										SLIGHTLY LOW										LOW				

FIG. 7A

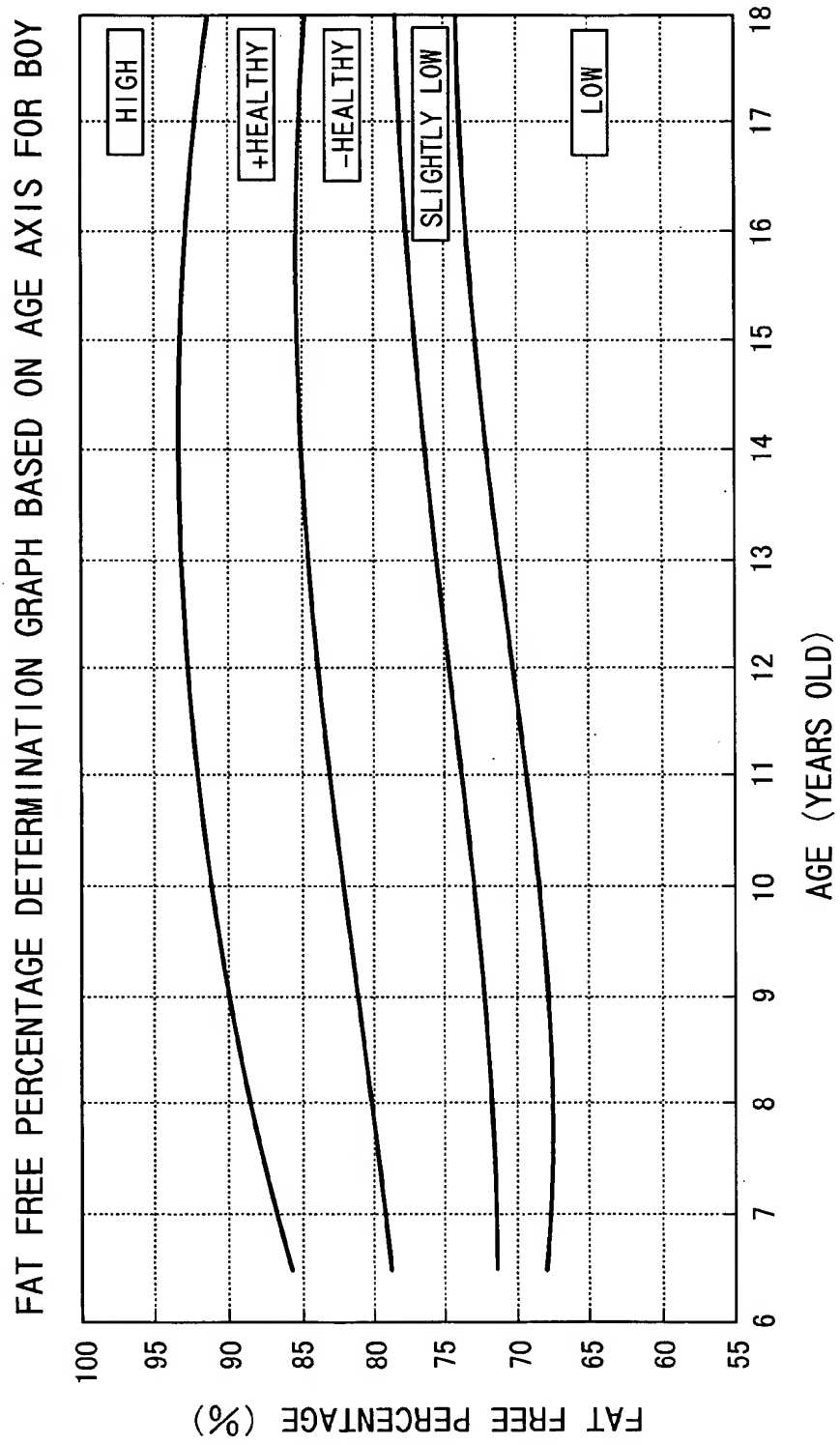




FIG. 7B

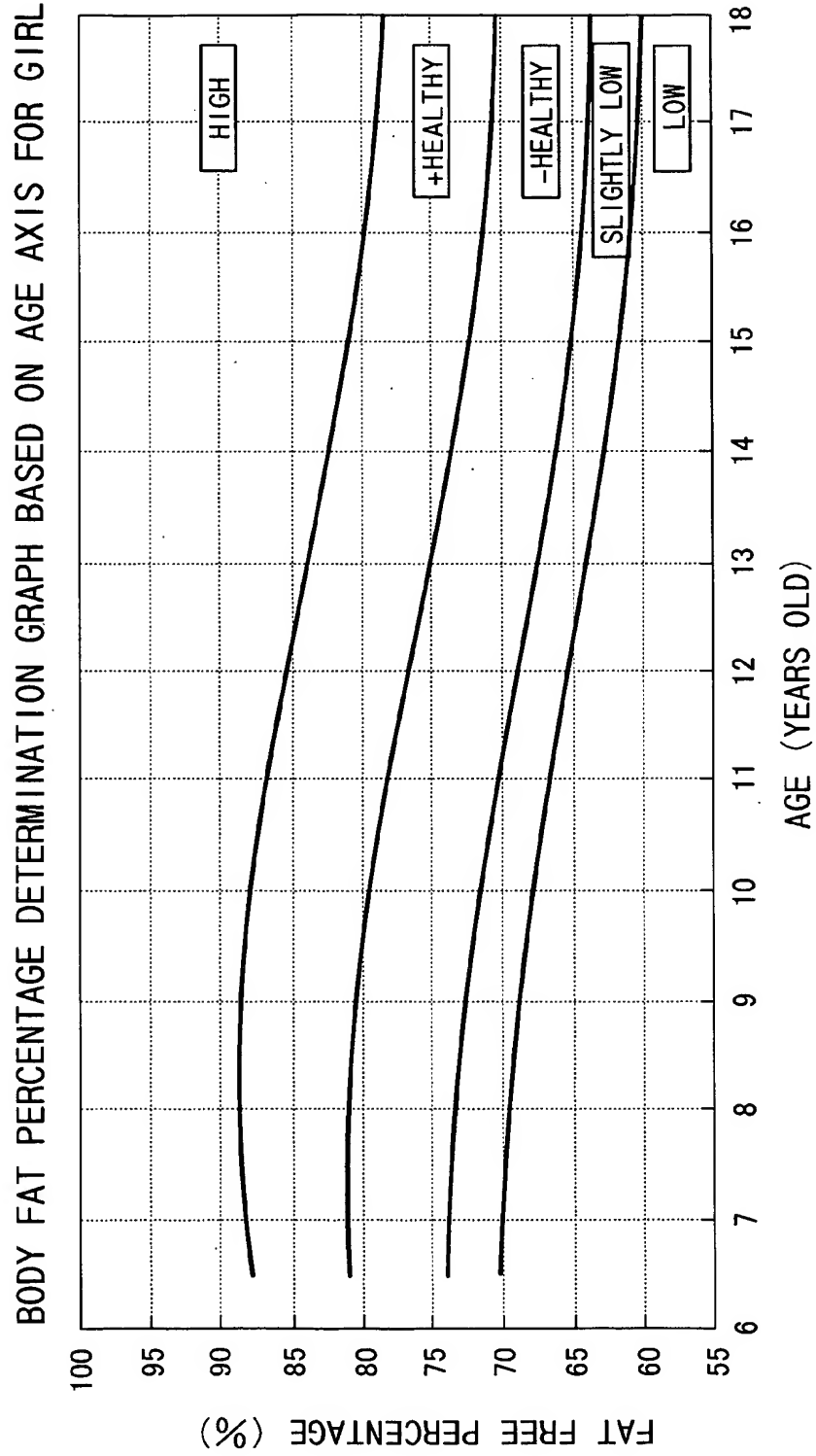
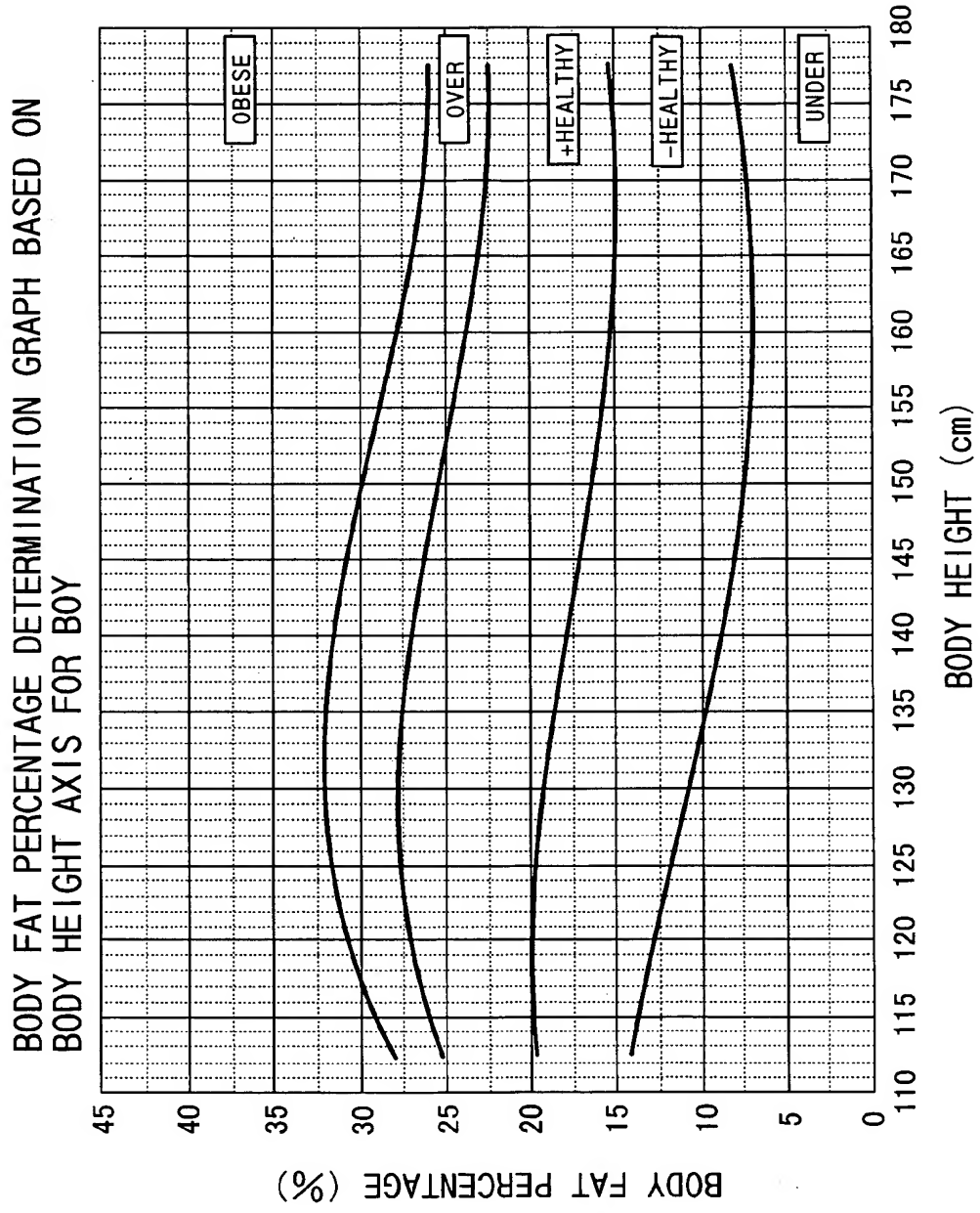
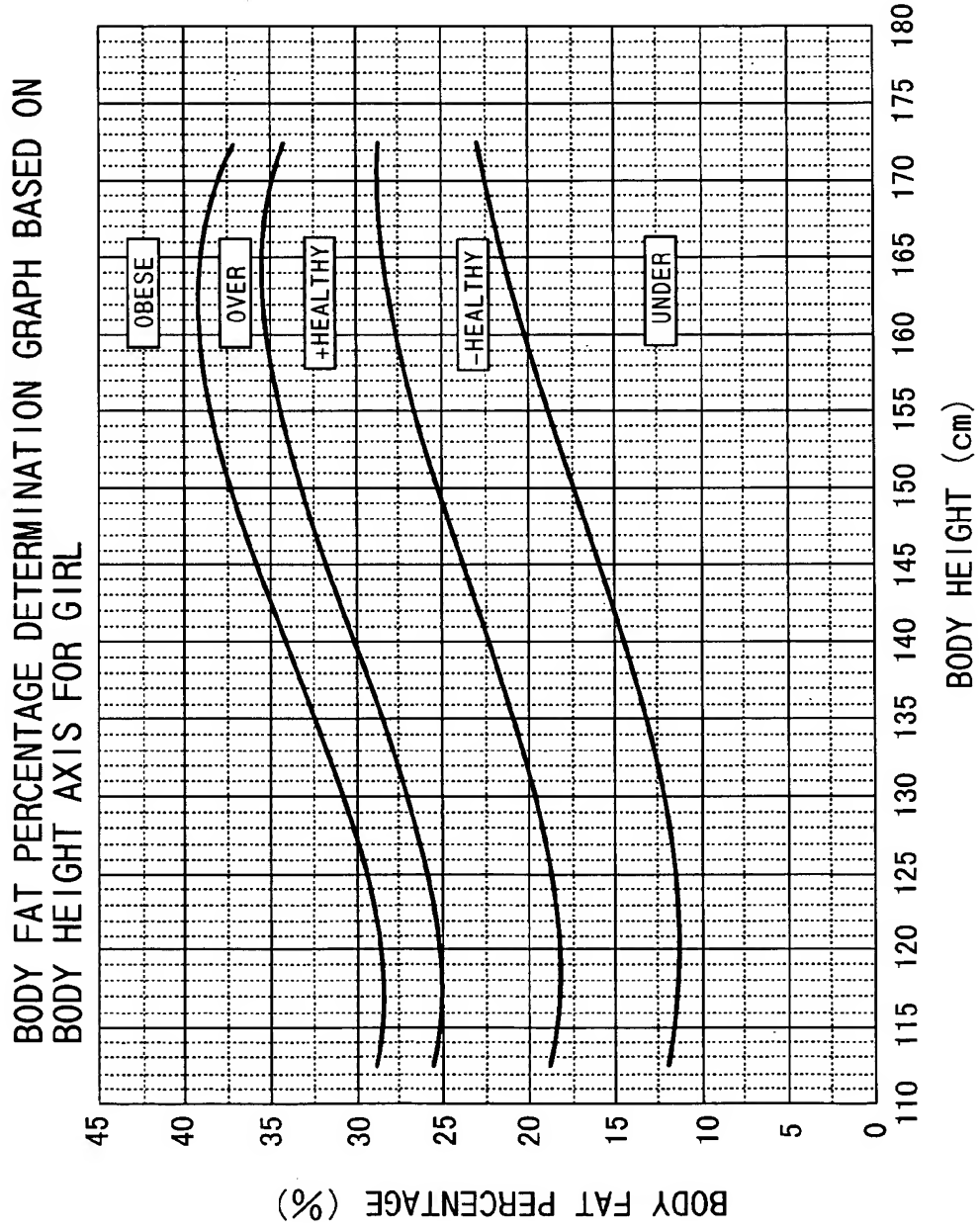


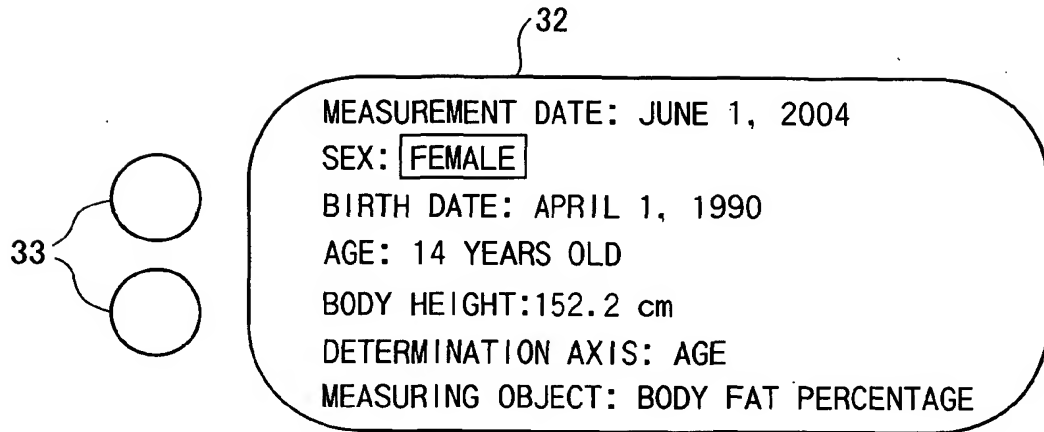
FIG. 8A



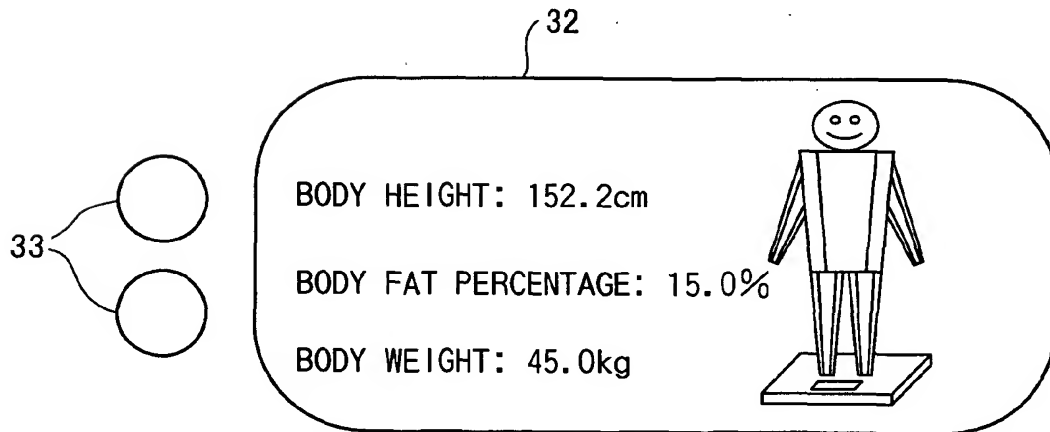
**FIG. 8B**



**FIG. 9**

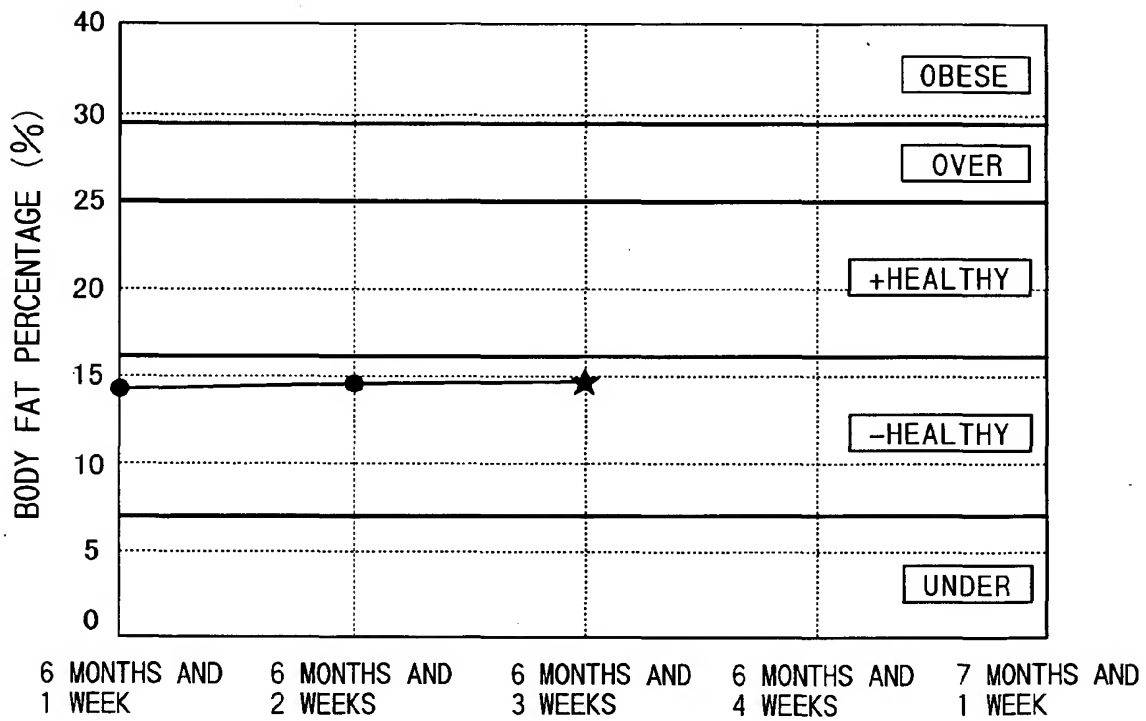


**FIG. 10**



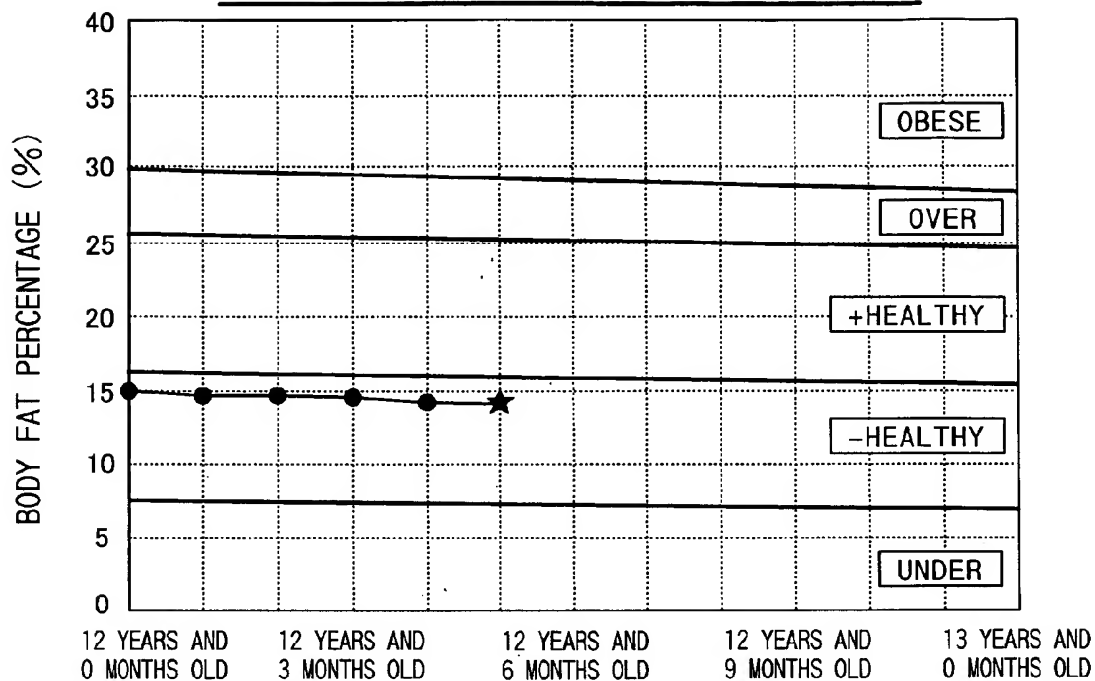
**FIG. 11**

BODY FAT PERCENTAGE AT 12 YEARS PLUS 6 MONTHS OLD



**FIG. 12**

**BODY FAT PERCENTAGE AT 12 YEARS OLD**



**FIG. 13**

**BODY FAT PERCENTAGE IN GROWTH PERIOD**

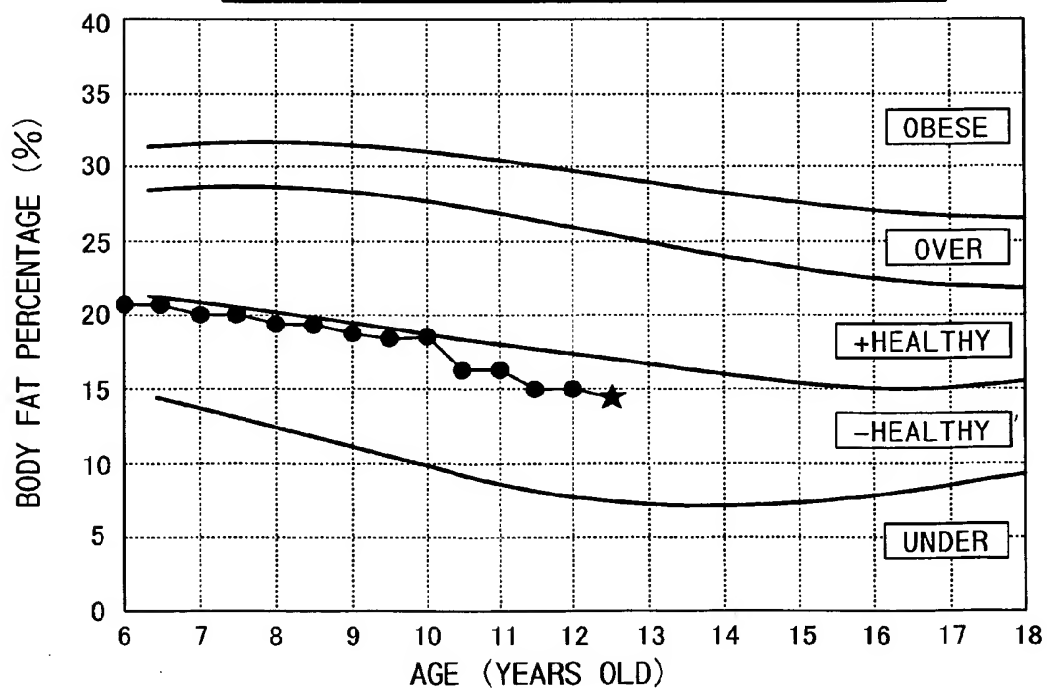


FIG. 14

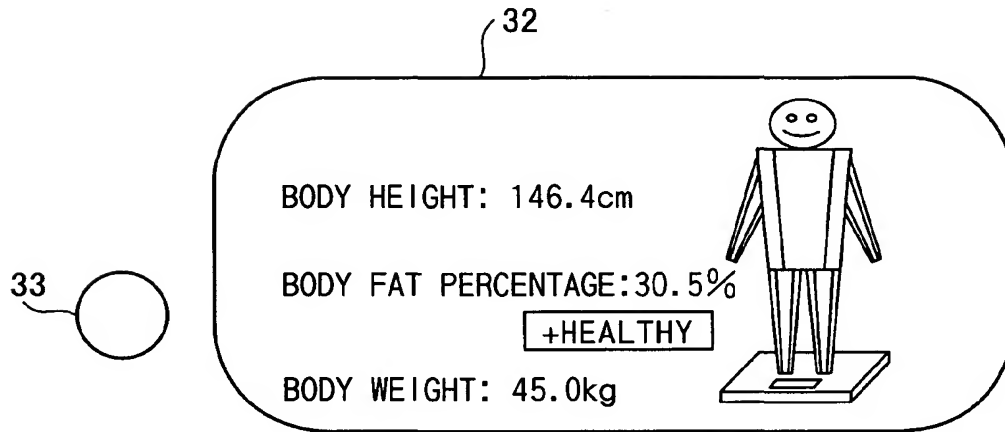


FIG. 15

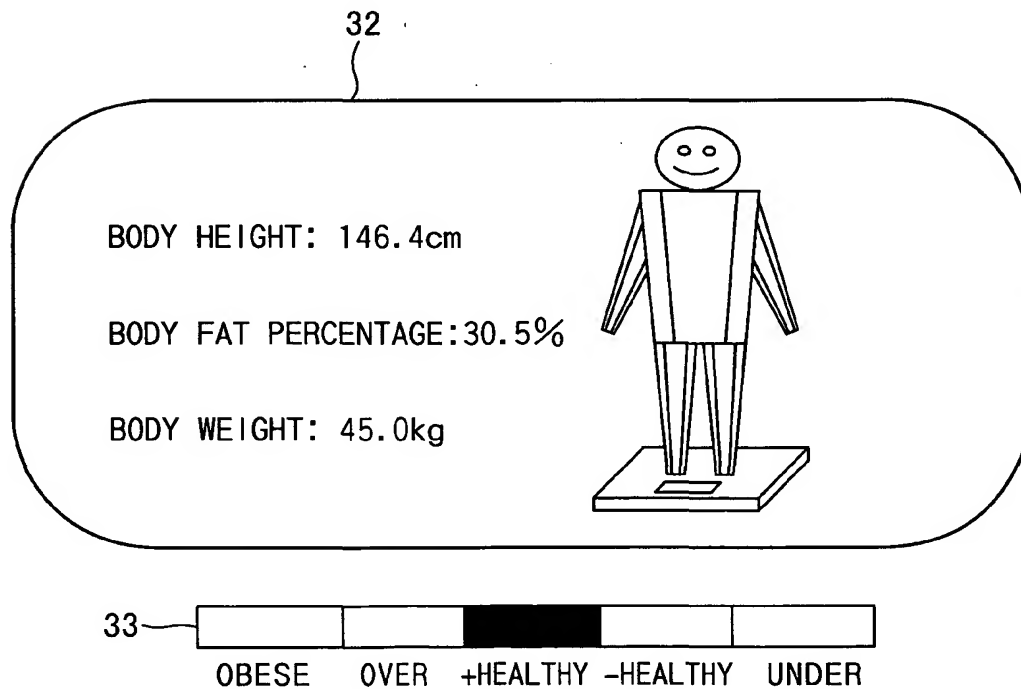


FIG. 16A

BOY	BODY FAT PERCENTAGE																																												
6 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
7 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
8 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
9 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
10 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
11 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
12 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
13 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
15 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
16 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
17 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
	UNDER						-HEALTHY						+HEALTHY						OVER						OBESE																				



FIG. 16B

GIRL	BODY FAT PERCENTAGE																																												
	UNDER							-HEALTHY							+HEALTHY							OVER							OBESE																
6 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
7 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
8 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
9 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
10 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
11 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
12 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
13 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
15 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
16 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
17 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45

FIG. 17A

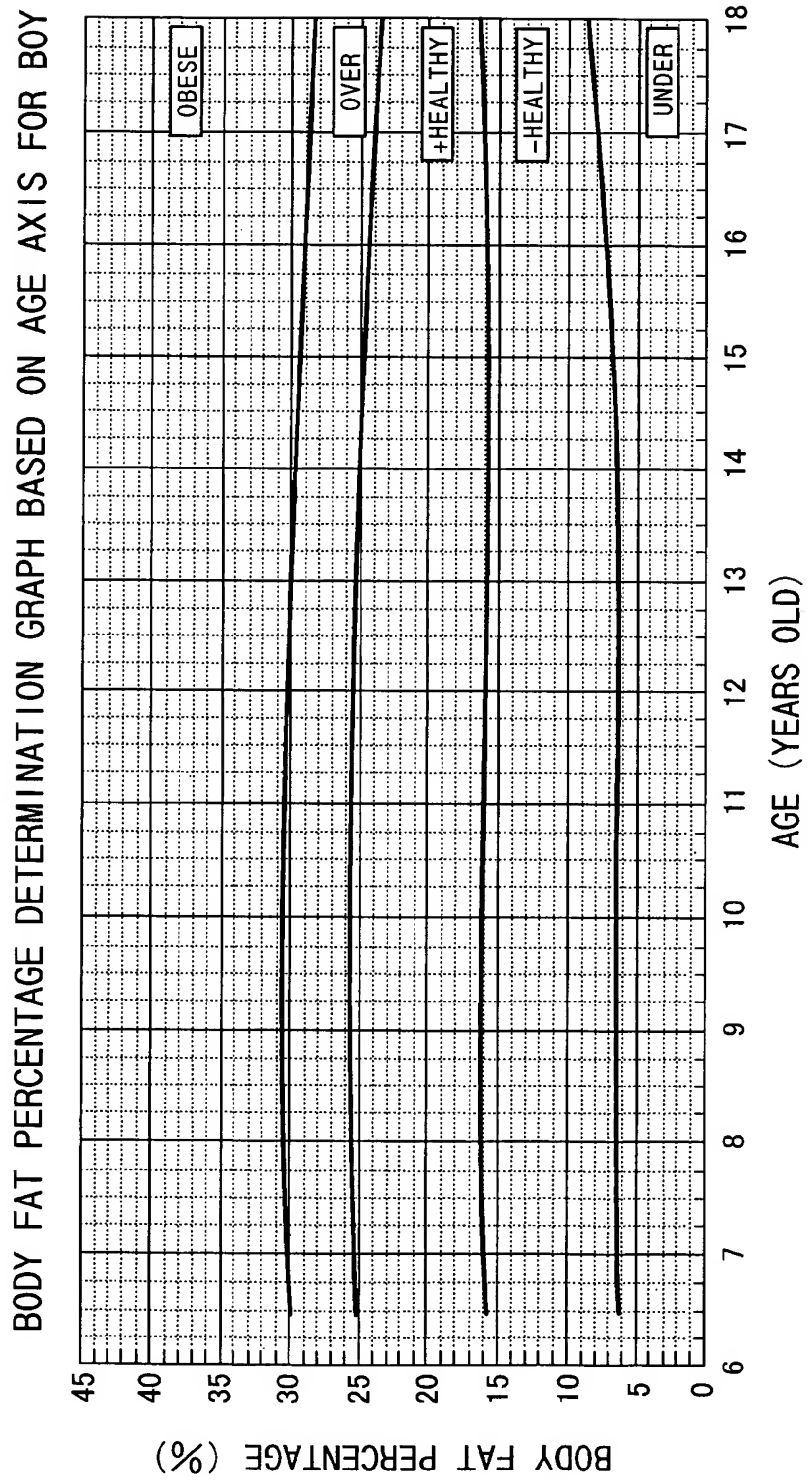


FIG. 17B

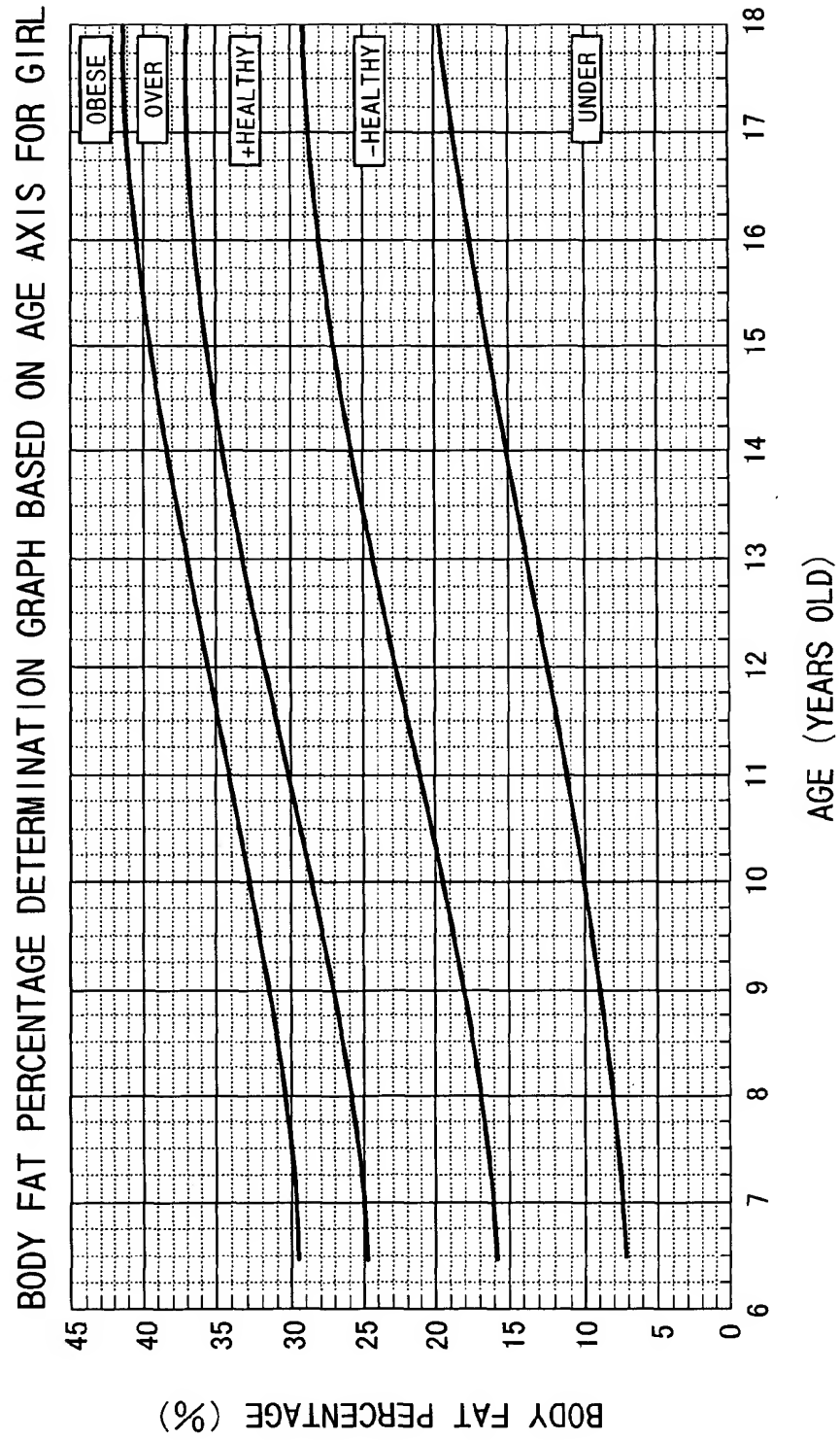


FIG. 18A

BOY	FAT FREE PERCENTAGE															
	HIGH				+HEALTHY				-HEALTHY				SLIGHTLY LOW			
6 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
7 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
8 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
9 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
10 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
11 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
12 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
13 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
14 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70
15 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70
16 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
17 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
	HIGH				+HEALTHY				-HEALTHY				SLIGHTLY LOW			
													LOW			

FIG. 18B

GIRL		FAT FREE PERCENTAGE																																															
6 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
7 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
8 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
9 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
10 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
11 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
12 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
13 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
14 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
15 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
16 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
17 YEARS OLD	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56				
	HIGH										+HEALTHY										--HEALTHY										SLIGHTLY LOW								LOW										

FIG. 19A

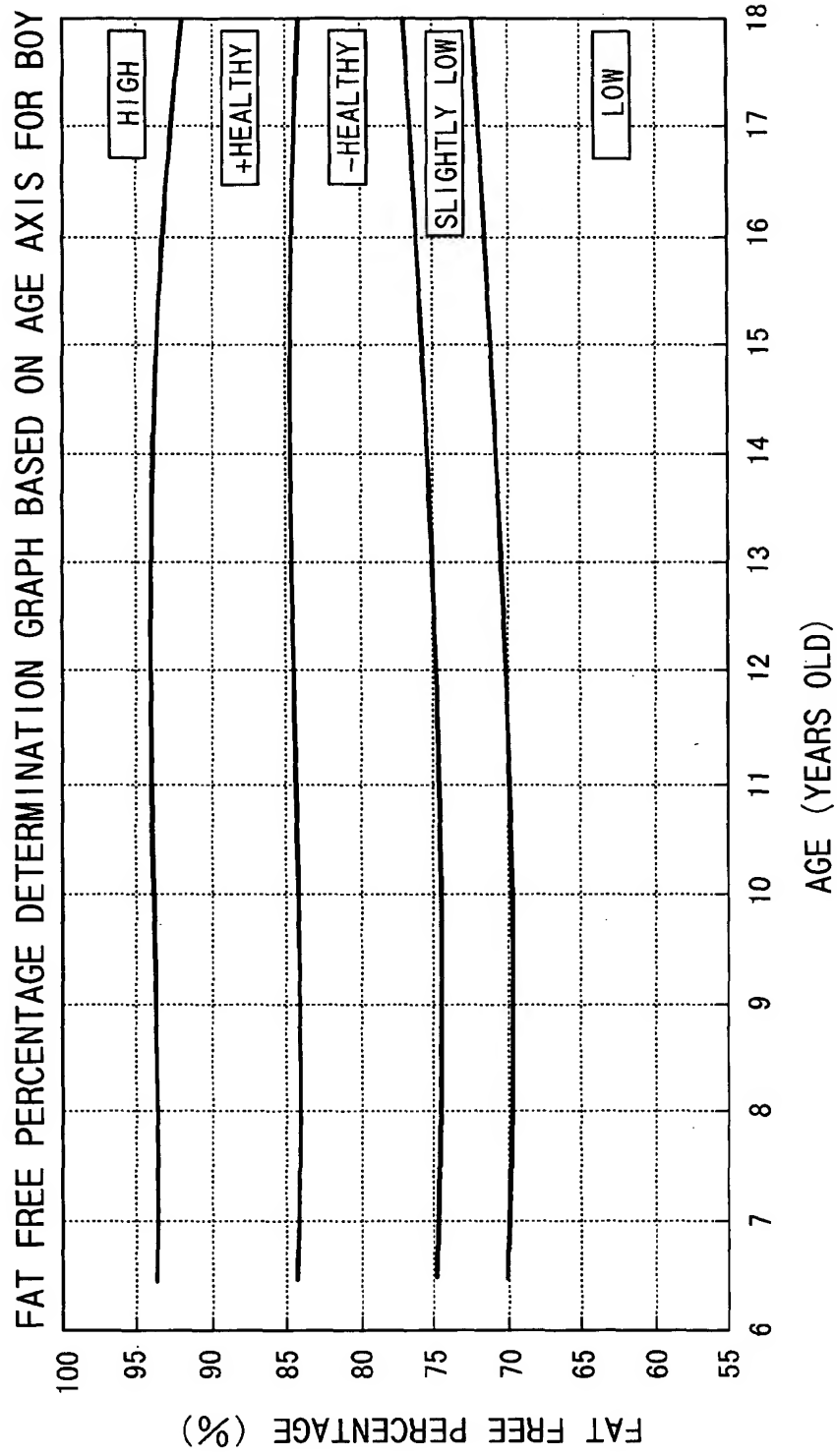


FIG. 19B

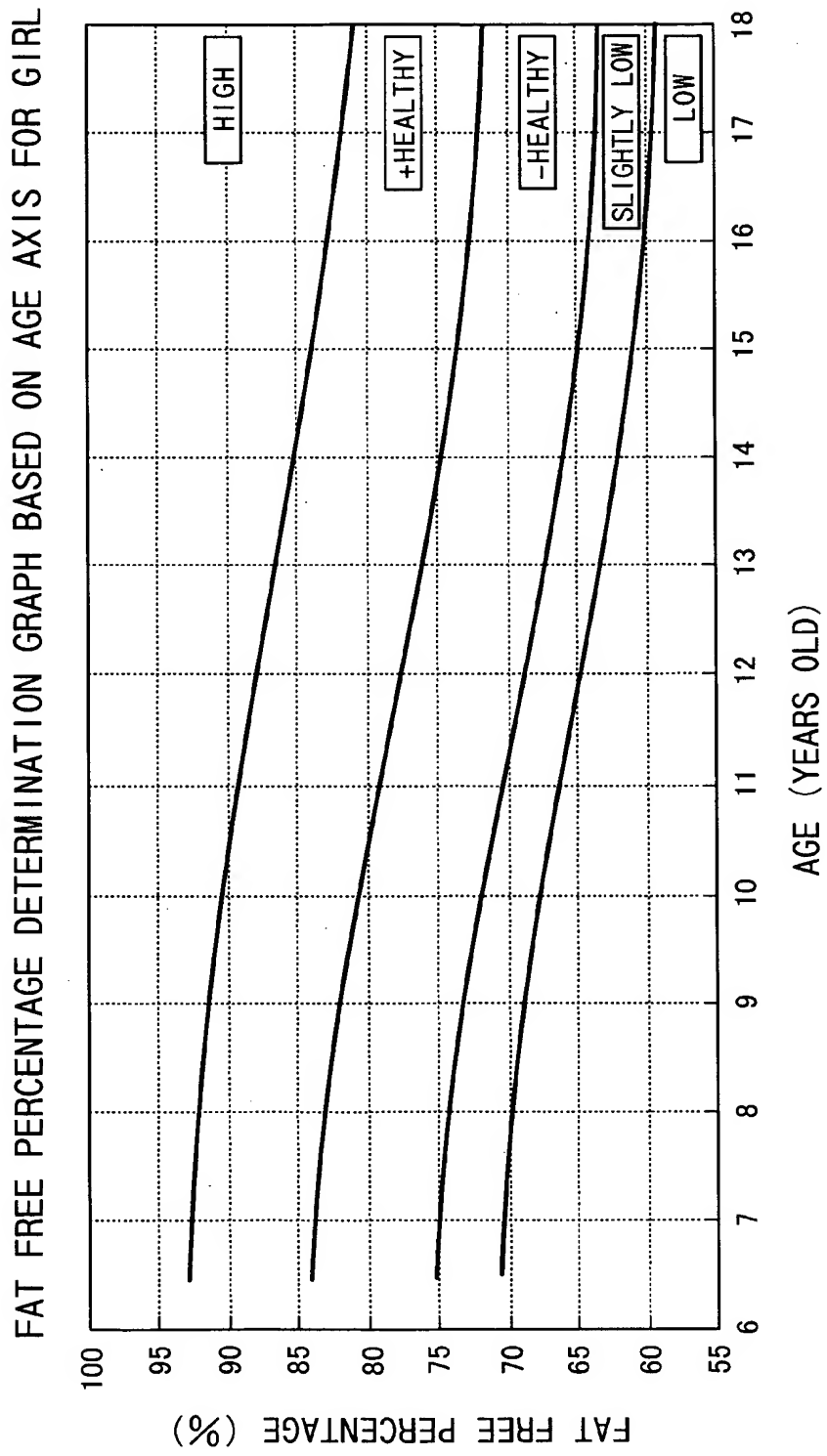
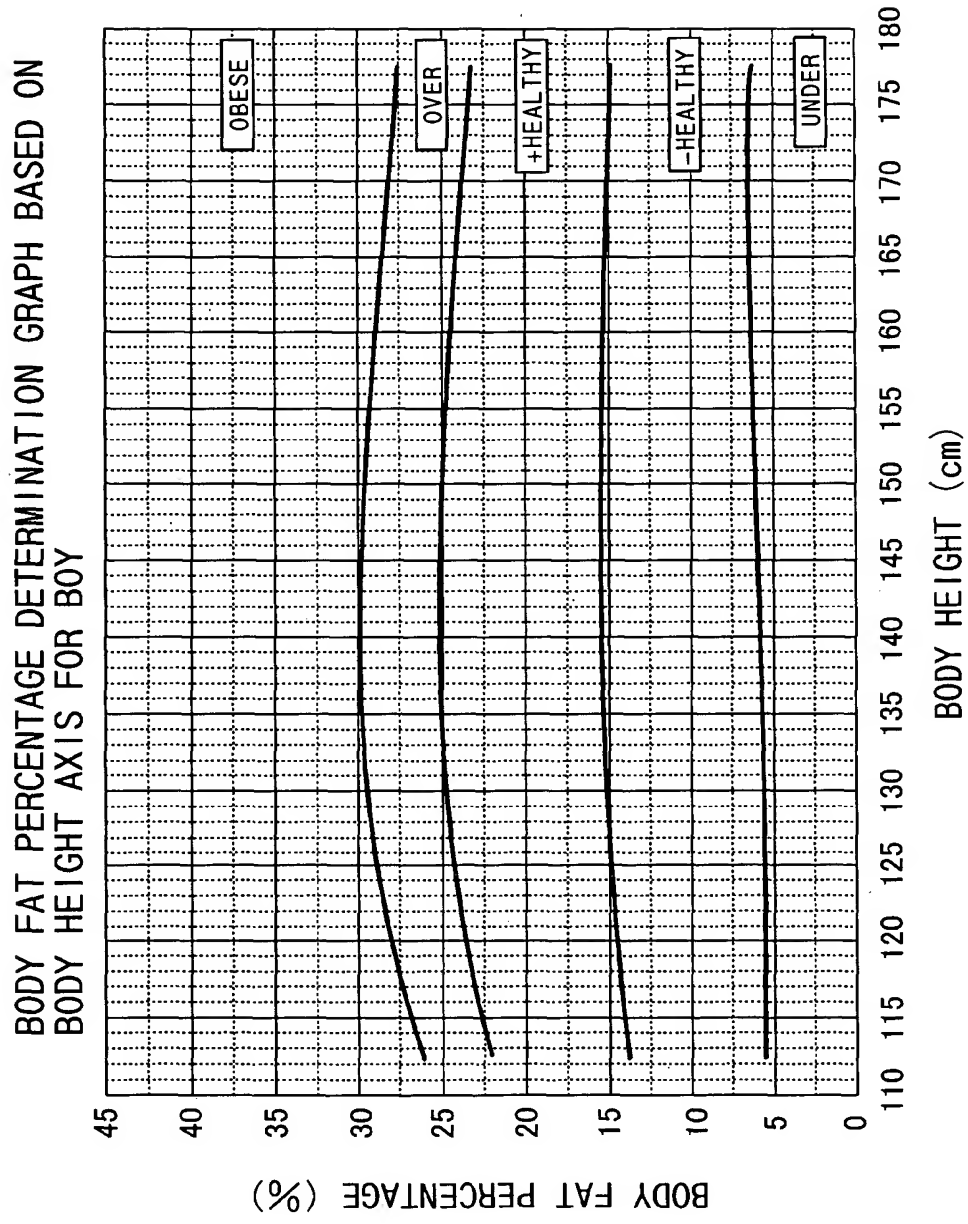


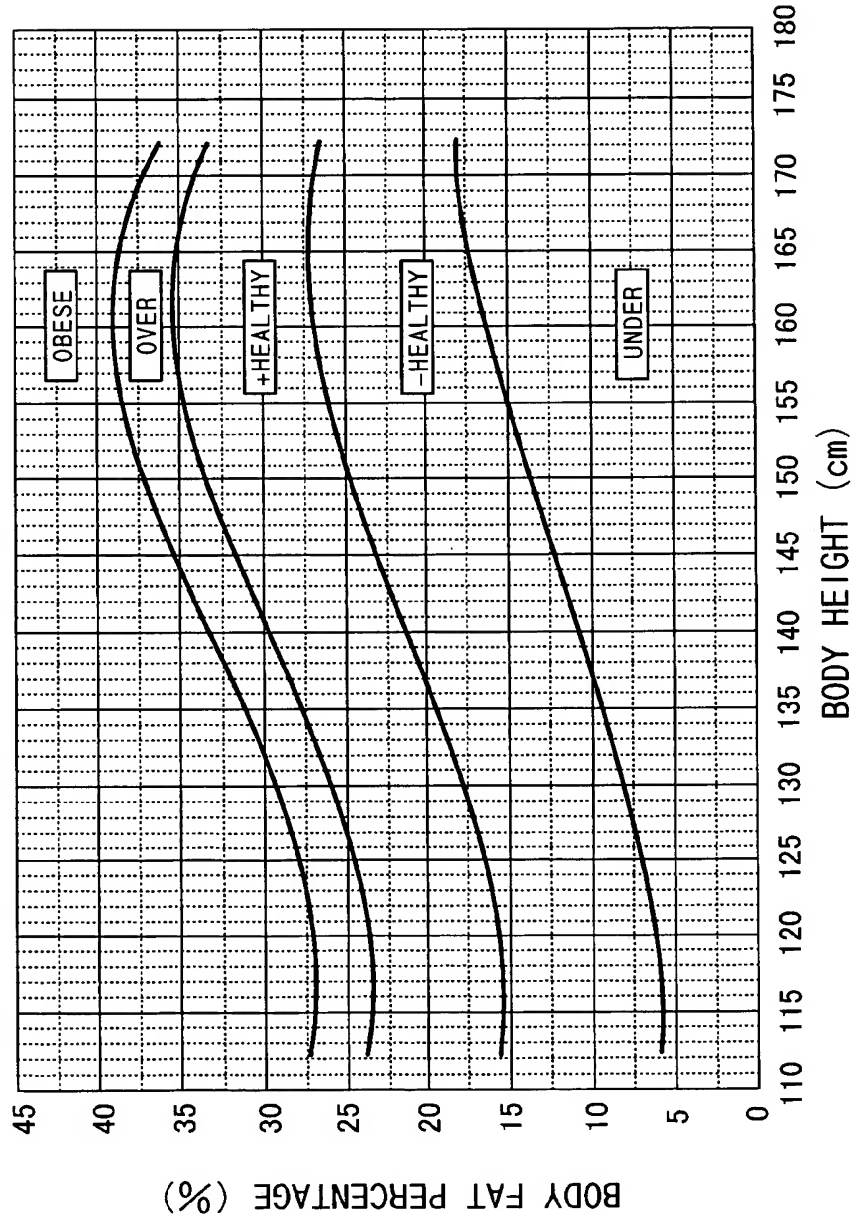
FIG. 20A

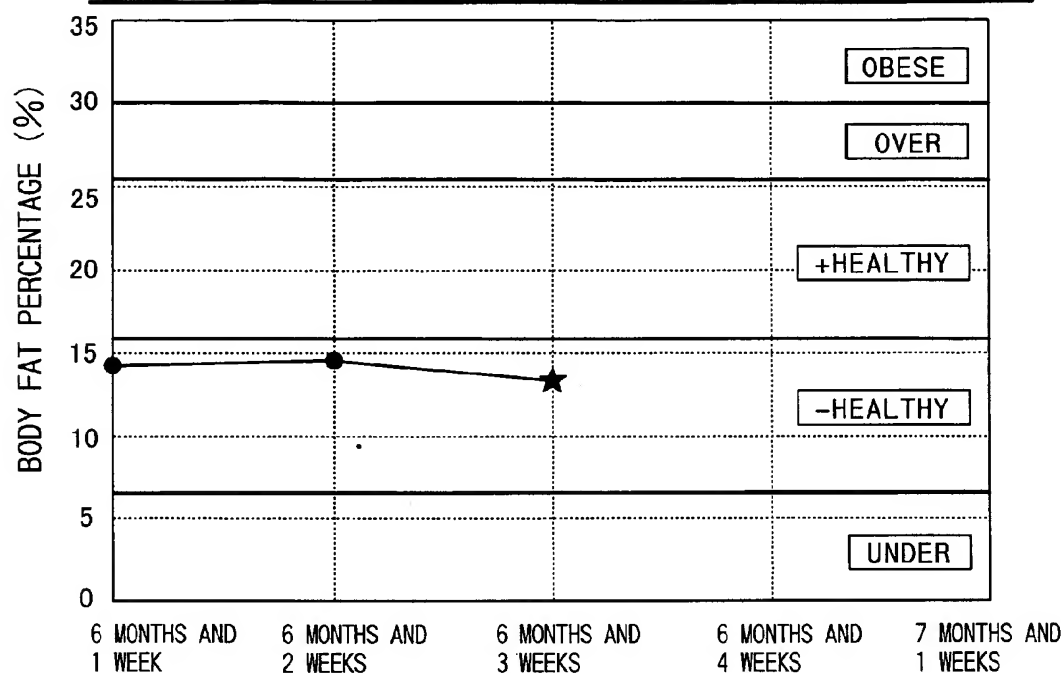
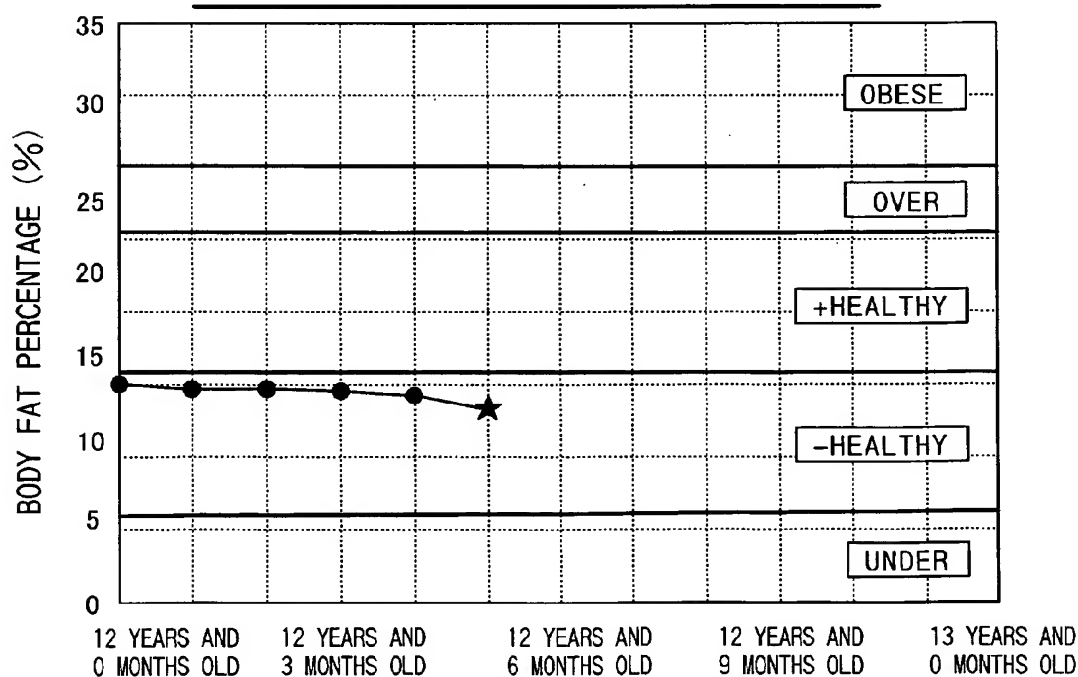




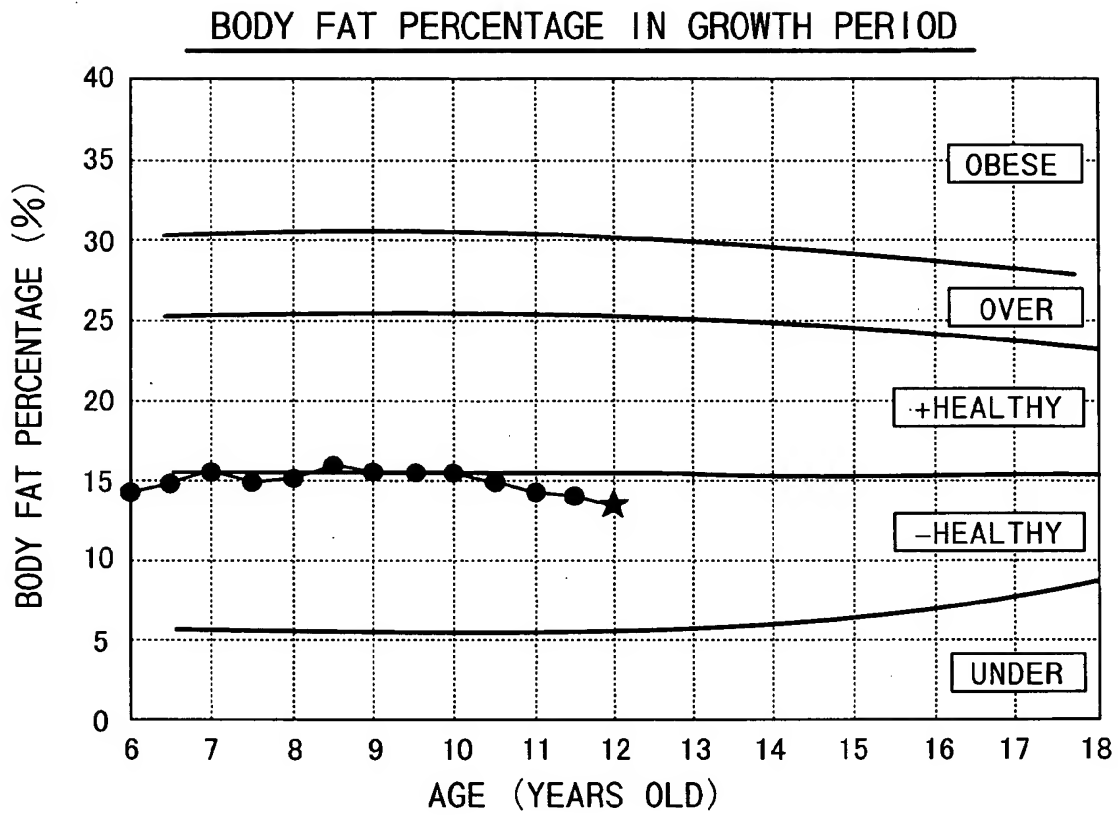
**FIG. 20B**

BODY FAT PERCENTAGE DETERMINATION GRAPH BASED ON  
BODY HEIGHT AXIS FOR GIRL



**FIG. 21****BODY FAT PERCENTAGE AT 12 YEARS PLUS 6 MONTHS OLD****FIG. 22****BODY FAT PERCENTAGE AT 12 YEARS OLD**

**FIG. 23**



**FIG. 24**

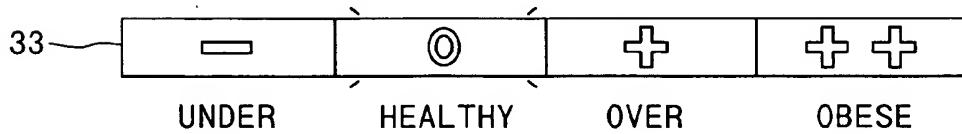


FIG. 25A

BOY	BODY FAT PERCENTAGE																																												
5 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
6 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
7 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
8 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
9 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
10 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
11 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
12 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
13 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
14 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
15 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
16 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
17 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
18 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
	UNDER										HEALTHY										OVER										OBESE														

FIG. 25B

GIRL	BODY FAT PERCENTAGE																																																
	UNDER															HEALTHY															OVER															OBESE			
5 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
6 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
7 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
8 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
9 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
10 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
11 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
12 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
13 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
14 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
15 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
16 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
17 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				
18 YEARS OLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45				



European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 05 01 8843

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Y	* paragraphs [0019], [0131] - [0136], [0228], [0230], [0234], [0235], [0241], [0242] *	3,4,11, 12	
Y	US 6 354 996 B1 (DRINAN DARREL ET AL) 12 March 2002 (2002-03-12) * column 5, lines 29-37 *	3,11	
Y	US 2004/035611 A1 (HONDA YUKA ET AL) 26 February 2004 (2004-02-26) * paragraph [0079] *	4,12	
A	US 2004/148127 A1 (KRIGER YEFIM G) 29 July 2004 (2004-07-29) * paragraph [0047] *	1,9	
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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>19 December 2005</b>	Examiner <b>Martelli, L</b>
<div>CATEGORY OF CITED DOCUMENTS</div> <div> X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document </div> <div> T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  &amp; : member of the same patent family, corresponding document </div>			

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EPO FORM 1503 03.82 (P04C01)

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19-12-2005

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